

## **TECHNICAL FISHERY REPORT 93-10**

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Alaska Department of Fish and Game  
Division of Commercial Fisheries  
P.O. Box 25526  
Juneau, Alaska 99802-5526

July 1993

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### **Upper Cook Inlet Salmon Escapement Studies, 1991**

by

**Bruce E. King**

**Randall Z. Davis**

and

**Kenneth E. Tarbox**

The Technical Fishery Report Series was established in 1987, replacing the Technical Data Report Series. The scope of this new series has been broadened to include reports that may contain data analysis, although data oriented reports lacking substantial analysis will continue to be included. The new series maintains an emphasis on timely reporting of recently gathered information, and this may sometimes require use of data subject to minor future adjustments. Reports published in this series are generally interim, annual, or iterative rather than final reports summarizing a completed study or project. They are technically oriented and intended for use primarily by fishery professionals and technically oriented fishing industry representatives. Publications in this series have received several editorial reviews and at least one *blind* peer review refereed by the division's editor and have been determined to be consistent with the division's publication policies and standards.

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## **ACKNOWLEDGMENTS**

We would like to acknowledge the work of the permanent seasonal staff responsible for collection of data:

Kenai River sonar -

Dave Westerman (Crew Leader), Jennifer Brannen, Jim Cofske, Amy Warfle, Jeri Best;

Kasilof River Sonar - Bill Glick (Crew Leader), Pako Lehtinen, Phil Morin;

Yentna River Sonar - Stanley Walker (Crew Leader), Kerri Darning, Wayne Lehtinen;

Crescent River Sonar - Mark Schlenker (Crew Leader), Scott Phillips;

Sustina River Fishwheel - Carl Nadelhoffer (Crew Leader), Gordon Shuler.

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## ABSTRACT

Sockeye salmon *Oncorhynchus nerka* spawning escapements into four river systems of Upper Cook Inlet, Alaska, were estimated using Bendix Corporation side-scanning sonar equipment. Estimated sockeye salmon escapements were 647,597 into the Kenai River, 238,269 into the Kasilof River, 44,578 into the Crescent River, and 109,632 into the Yentna River. Indices of escapements of other salmon species into the Yentna River were also obtained by sonar: 75,377 pink *O. gorbuscha*, 21,655 chum *O. keta*, and 57,275 coho *O. kitsutch* salmon. Age composition of sockeye salmon was distributed within 3 age classes in both the Kenai River, ages 1.3 (31.6%), 1.2 (48.2%), and 2.3 (11.4%), and Kasilof River ages 2.2 (29.0%), 1.2 (31.5%), and 1.3 (33.4%). Age-1.3 sockeye salmon were the most abundant age class in the Crescent (50.4%) and Susitna (68.3%) Rivers. Age composition of Yentna River sockeye salmon was distributed within four age classes: 0.3 (10.1%), 1.2 (25.2%), 1.3 (44.1%), and 2.3 (11.1%). Mean length and sex composition data were collected for sockeye salmon in each river. Sockeye salmon in all rivers migrated near the shore. Most sockeye salmon migrated during the hours of darkness in the Kenai and Crescent Rivers and during the afternoon and evening hours in the Kasilof and Yentna Rivers.

**KEY WORDS:** Pacific salmon, spawning escapements, hydroacoustic enumeration, biological sampling, migratory behavior, Upper Cook Inlet, sockeye salmon

## INTRODUCTION

Hydroacoustic techniques were developed to enumerate sockeye salmon *Oncorhynchus nerka* in the Kenai and Kasilof Rivers starting in 1968. Prior to 1968, sockeye salmon escapement enumeration by the Alaska Department of Fish and Game (ADF&G) was inadequate because it provided no information about the proportion of the escapement that spawned in glacially occluded waters. In many rivers of Upper Cook Inlet, Alaska, (Figure 1) surveys were limited to clear water spawning areas (King and Davis 1989). Efforts to manage the commercial harvest of sockeye salmon were also hampered by delays in daily and cumulative estimates of total escapement.

Prior escapement enumerations have been documented by Waltemyer et al. (1980), Tarbox et al. (1983), King and Tarbox (1984, 1986, 1987, 1988, 1989a, 1989b, and 1991), King (1990). Backup data for the present report were published in a separate archival report (King and Davis 1992).

The program objectives of Upper Cook Inlet (UCI) escapement projects in 1991 were to estimate (1) the daily and cumulative abundance of sockeye salmon runs to the Kenai, Kasilof, Crescent, and Yentna Rivers, and (2) the age, length, and sex composition of those escapements. Information concerning Yentna River pink *O. gorbuscha*, chum *O. keta*, and coho *O. kisutch* salmon abundance was also obtained.

## METHODS

Operational characteristics of Bendix Corporation<sup>1</sup> side-scanning sonar counters have been described by King and Tarbox (1989a), Gaudet (1983), and Bendix Corp (1980, 1984). Pulse width was 100  $\mu$ s and frequency 515 Khz for all counters used. Two- and four-degree transducers were multiplexed in an alternating mode. The counting threshold was approximately -38 Db at the minimum 35 v power input recommended by the manufacturer (A. Menin, Sylmar, Ca., personal communication). Counting thresholds could be lowered by increasing voltage to the system. A technical consultant tested proper operation prior to deployment and reinspected the counters when migrating fish densities neared maximum levels for each system (A. Menin, Hydroacoustic Consulting). Counters were operated without artificial substrates on the north bank of the Kenai River and both banks of the Crescent River.

Projects were operated from 1 July to 12 August on the Kenai River, 15 June to 8 August on the Kasilof River, 7 July to 12 August on the Yentna River, and 26 June to 7 August on the Crescent River.

Raw hourly output data were edited to remove counts from debris, bottom echoes, or other sources of false counts. A daily average was calculated for hourly counts for inshore (1–6) and offshore (7–12) sonar sectors by

$$C_a = C_b/N,$$

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<sup>1</sup>Use of a company's name does not constitute product endorsement.

where:  $C_a$  = average count per sector/hour;  
 $C_b$  = valid hourly counts for inshore and offshore sectors; and  
 $N$  = number of sector/hour units which contained only valid counts.

The average count was then substituted at any sector/hour block where counts were deleted. Temporal and spacial behavior of sockeye salmon at the sonar sites was assessed by examining fish distribution by sector, hourly passage rate, bank preference, and cumulative proportion of sonar counts by day.

Simultaneous operation of sonar equipment and smolt traps occurred on the south bank of the Kenai River during the first 9 d of sonar operation. A substrateless counter was replaced with a counter that used an artificial substrate on 10 July.

Periodically throughout the season, we tested orientation of the acoustic beam by the use of an artificial fish: i.e., an air-tight plastic sphere weighted and moved along the river bottom at varying distances from the transducer. Simultaneous detection of the target by the counter and visual identification of the target with an oscilloscope confirmed accurate aiming of the beam.

Visual counts from an oscilloscope were compared to the counts accumulated by the counter during a 10-min period or for a visual count of 100 fish. If a 20% variance between observed targets and targets recorded by the counter occurred, adjustments were made to the counter. In low density situations (< 500 fish/h) counters were calibrated for a cumulative time of 2 h/bank each day. Monitoring on the Kenai and Yentna Rivers was increased to a minimum of 3 h/bank/d when densities increased. Counter monitoring occurred from 0700 through 2400 hours on the Kasilof, Crescent, and Yentna River systems and throughout the 24-h period on the Kenai River. Monitoring on the Kenai and Kasilof Rivers was increased during periods of the day when fish behavior was known to change. Counters were monitored several times throughout the day on the Crescent River. In addition, when an audible alarm signaled the passage of fish, monitoring was intensified.

Fish wheels were used to determine species proportions of the escapements and to provide samples for age, length, and sex composition in the Kenai (north bank), Kasilof (north bank), and Yentna (both banks) Rivers. A fixed fish trap was used for the same purposes in the Crescent River. In addition, age, length, and sex information was collected from sockeye salmon captured in a fish wheel located in the upper Susitna River near Talkeetna.

Fish wheel catches at the Kenai and Yentna River sites were expanded for each 24-h period based on the hourly catch rate during the hours of operation by

$$F_d = (F_h/H) 24 ,$$

where:  $F_d$  = expanded fish wheel catch for 24 h;  
 $F_h$  = fish wheel catch for hours operated; and  
 $H$  = hours fish wheel operated.

With the exception of the Kasilof River, daily fish wheel or trap catches were grouped into sample sizes of at least 150 salmon to calculate the proportion of catch by species. The daily sonar count was multiplied by these proportions to obtain the sonar count for each species. Sonar counts recorded in the Kasilof River were not apportioned to species because the location of the fish wheel was in an area of extremely high water velocity, and we believed that there was a bias toward a higher capture rate of chinook salmon *O. tshawytscha*.

Factors influencing accuracy of escapement estimates for pink, coho, chum, and chinook salmon were discussed by Tarbox et al. (1981, 1983). Counts apportioned to these species are considered to be index counts.

Sample sizes for estimating sockeye salmon age composition were based on methods for estimating multinomial proportions developed by Thompson (1987). Historical age class proportions (1983–90) were used to calculate a sample size so that the estimated proportion of each major age class was within 5% of the true proportion 90% of the time. The largest sample size calculated in this manner was chosen as a minimum sample size for 1991. The minimum sample size was increased by 10% to account for unusable scales, and this number was used as the total sample size required per stratum. The sample size per stratum was then multiplied by the number of strata to determine total season sample size. In general, the number of temporal strata was set to detect changes in age composition over the course of the season (Waltemyer 1990). Selection of the number of strata was also influenced by logistical considerations. Two strata were selected for the Crescent and Susitna Rivers, and three strata for the Kenai, Kasilof, and Yentna Rivers.

Scale samples used to determine fish age were collected daily, if possible. Determination of daily sample sizes was based on a percentage of the previous day's escapement. These percentages were calculated by dividing the total season sample size by the anticipated total escapement. To provide scales for the stock identification program, sockeye salmon were also sampled at least 1 d each week from the Kenai and Kasilof Rivers. These scales were included in postseason age composition analysis.

A chi-square analysis was performed to examine changes in the number of salmon within each of the major (>10% of the total sample) age classes through time. If the null hypothesis was rejected, then chi-square tests were repeated between sampling strata to determine when changes occurred.

Fork length in millimeters and sex were recorded for all sockeye salmon captured. Sex ratios and mean lengths were calculated by grouping all samples together regardless of type or timing of sampling.

Index-area escapement foot surveys were conducted by ADF&G Fisheries Rehabilitation, Enhancement and Development (FRED) Division on Tustumena Lake (Kasilof River) and in limited areas of the Kenai River drainage by the U.S. Department of Agriculture, Forest Service (USFS). All surveys were conducted between 1 August and 15 September. Index-area counts and other survey data referenced in this report are totals of live and dead counts. If more than one survey was completed on a system, only the result of the survey having the highest total count was reported.

## RESULTS

### *Kenai River*

From 1 July through 12 August, 652,079 salmon migrated past the Kenai River sonar site (Table 1). Sockeye salmon comprised 647,597 of this total (Table 2). The estimated sockeye salmon spawning escapement was 430,702 (Table 3); the desired escapement goal range is 400,000-700,000. Record numbers of sockeye salmon (112,892) were counted at the Hidden Lake weir (Table 4), of which 77,216 were harvested (G. Kyle, ADF&G, Soldotna, personal communication).

No significant difference in run timing by bank was detected (King and Davis 1991), but more sockeye salmon (73%) migrated along the north bank of the river (Table 6). Eighty percent of the sockeye salmon escapement passed the sonar counters in 15 d (1982–91 mean = 18 d, range = 12–25 d; Table 5). The midpoint of the escapement was 27 July, and there were three distinct peaks in passage at the sonar site (Figure 2). Distribution across the counting range on the north bank was less shore-oriented than the south bank (Table 7); 89.3% of the counts occurred within the inshore 13.5 m of the counting range. On the south bank, 89.2% of the counts occurred within 6.0 m of the transducer (Figure 3). Bottom noise limited the south bank counting range to 9.0 m for the first 9 d of operation; however, 91% of the counts accumulated during this period occurred within 6.2 m of the transducer, accounting for 3.6% of the total counts recorded for this bank.

A pattern of increased salmon passage in the evening and early morning hours was observed on the south bank (Figure 4). Passage between 1900 and 0300 hours accounted for 58% of the total south bank migration (King and Davis 1991), exceeding the average for a constant hourly passage rate ( $100\%/24\text{ h} = 4.2\%$ ) by 21.1%. On the north bank the diel passage of fish was somewhat less defined; from 1300 through 0300 hours the average for a constant hourly passage rate was exceeded, accounting for 68.6% of the bank total.

A total of 6,832 sockeye salmon were captured in the fish wheel (Table 8), and lengths and scale samples were obtained from 2,504. Mean lengths of age-.3 fish were the smallest recorded in the previous 10 years except for age-2.3 males (Table 9). Female spawners composed 51.9% of the total sampled.

The largest component of the sockeye salmon escapement was age 1.2 (48.2%), followed by ages 1.3 (31.6%) and 2.3 (11.4%; Table 10). The proportions of the three major age classes changed significantly over time ( $\alpha = 0.05$ ,  $\chi^2 = 21.7$ ,  $P < 0.05$ , 6 df). Significant changes in age class proportions also occurred between two of the three time strata (Table 11).

Age-1.3 sockeye salmon were bound primarily for Quartz Creek, the mainstem river, and the shorelines and outlets of Kenai and Skilak Lakes. Sockeye salmon bound for Russian River were predominantly age 2.2 (J. Carlon, ADF&G, Soldotna, personal communication); those bound for Hidden Lake were predominantly age 1.2 (D. Waltemyer, ADF&G, Soldotna, personal communication).

Sonar counts for pink (2,551), coho (764), and chinook salmon (1,167) were <1% of the total (Table 1). No additional pink or coho salmon escapement estimates were made for the mainstem Kenai River. The estimated chinook salmon escapement was 9,925 early-run fish and 27,947 late-run fish (Nelson 1991).

### *Kasilof River*

A total of 238,269 salmon were counted at the Kasilof River sonar site from 15 June through 8 August 1991 (Table 12). This escapement estimate was within the desired escapement goal range of 150,000–250,000 fish. Sonar counts were not apportioned to species. The estimated number of natural spawners, i.e., estimated escapement minus brood stock used for artificial propagation of Tustumena Lake, was 229,419 fish (Table 13).

Sixty-one percent of the salmon counts for the season occurred on the south bank (Table 6), where 84.9% of the fish were enumerated within 9 m of the transducer (Table 7; Figure 5). The distribution of fish on the north bank was more shore oriented, where 79.5% of the total counts were within 4.5 m of the transducer.

The seasonal average hourly passage rate on the south bank exceeded the 4.2% average for a consistent passage rate during two periods of the day, 0600 through 0900 hours and 1700 through 2400 hours, although this pattern was not consistent each day (Figure 6; King and Davis 1991). The average hourly passage rate on the north bank exceeded the average for a consistent passage rate during the hours 1600 through 2100 and 2400 through 0500, but variations from this pattern were observed (Figure 6).

The midpoint of the sockeye salmon escapement occurred on 15 July, 1 d before the mean for the previous 9 years (range 11–22 July; Table 16). Eighty percent of the escapement occurred in 30 d, 1 d less than the historical mean (1982–90). No differences in timing between the north and south banks were detected (King and Davis 1991). There were four peaks in daily passage.

A total of 1,889 sockeye salmon were captured in the Kasilof River fish wheel (Table 17). Ages 1.3 (33.4%), 1.2 (31.5%), and 2.2 (29.0%) were the dominant age classes (Table 18). The proportion of age-2 sockeye salmon increased and the proportion of age-3 sockeye salmon decreased as the season progressed (Table 11;  $\alpha = 0.05$ ,  $\chi^2 = 269.87$ ,  $P < 0.05$ , 6 df). With the exception of age-3 females, sockeye salmon average lengths were on the low end of the historical range (Table 19). The male-to-female ratio was similar to that observed in previous years with the exception of age-1.3 fish, which was the highest recorded in 12 years of observation (1.3:1). Female spawners composed 47.9% of the escapement.

Approximately 56% of the counted tributary spawners entered Bear Creek (Table 14). A weir placed at Bear Creek provided a total escapement count; peak spawning counts from ground surveys provided estimates for the other tributaries (Table 15).

Run timing, counter limitations, and spawning locations relative to the sonar site made sonar escapement estimates for Kasilof River pink, coho, and chinook salmon impractical. Coho salmon entered the river primarily in August (G. Kyle, ADF&G, Soldotna, personal communication). The proportion of pink salmon spawning below the counting site was not known. Early- and late-run chinook salmon migrated past the sonar site during the time when sockeye were counted, but no counts were apportioned to this species.

### *Crescent River*

A total of 50,741 salmon were counted at the Crescent River sonar site from 26 June through 7 August 1991 (Table 20). Approximately 79% of the fish trapped were sockeye salmon (Table 21), resulting in an estimated escapement of 44,578. The desired sockeye salmon escapement goal for this system is 50,000 to 100,000 sockeye salmon.

Spacial distribution of fish was strongly shore oriented: 98.8% of the north bank counts and 96.0% of the south bank counts occurred within 4.5 m of the transducer (Table 7; Figure 7). Fish migrated on the north bank at rates which exceeded the hourly average for a constant passage rate during the hours 1900 through 0400 (Figure 8; King and Davis 1991). On the south bank the highest hourly passage rates occurred during the hours 1800 through 2400.

The midpoint of the sockeye salmon escapement occurred on 21 July, 5 d later than the historical mean (Table 22). The peak in daily passage occurred on 17 and 18 July (Figure 2), and 80% of the escapement passed the site in 21 d. More fish migrated along the south bank (Table 6). Two peaks in the migration were observed.

A total of 490 sockeye salmon were captured in the fish trap, of which 357 were sampled for age, length, and sex data. Age-1.3 (50.4%) fish were the most abundant age class, followed by ages 2.2 (16.8%), 2.3 (16.5%), and 1.2 (14.9%); (Table 23). Average lengths by sex and age class were among the smallest recorded in the 10-year database for age-.3 fish but were generally larger than any previously recorded means for age-.2 fish (Table 24). The ratio of males to females was higher in the age-.2 fish (2.1:1 for age 1.2 and 2.3:1 for age 2.2) than previously seen in this stock. Females accounted for 37.8% of the escapement.

### *Yentna River*

#### **Sockeye Salmon**

From 7 July through 12 August, 264,143 salmon were counted at the Yentna River sonar site (Table 25). The sockeye salmon escapement of 109,632 (Table 2) exceeded the lower end of the escapement goal range (100,000–150,000). No aerial surveys of index areas were conducted, but a weir was placed at Chelatna Lake (Table 26).



The midpoint of the sockeye salmon escapement occurred on 26 July (Table 27), 2 d later than the historical mean. Eighty percent of the escapement passed the counters in 17 d (Table 27). Nearly all of the sockeye salmon (92%) migrated adjacent to the south bank (Table 6). There were two distinct peaks.

Ninety percent of the salmon counted from the south bank were within 4.5 m of the transducer (Table 7, Figure 9). On the north bank 92.9% of the salmon were counted within 6.0 m of the transducer.

The seasonal hourly passage rate met or exceeded the average for a constant hourly passage rate during the hours 1600 through 0300 on both banks; 68.5% of the total counts for the south bank and 63% of the total counts for the north bank occurred during these hours.

A total of 6,136 sockeye salmon were captured in fish wheels at Yentna Station (Tables 28, 29), of which 1,509 were sampled for age, sex, and length data. The major components of the escapement were ages 1.3 (44.1%), 1.2 (25.2%), 2.3 (11.1%), and 0.3 (10.1%; Table 30). The proportion of age-1.2 fish increased and the proportion of age-1.3 fish decreased as the migration progressed (Tables 10, 11;  $\alpha = 0.05$ ,  $\chi^2 = 16.09$ ,  $p < 0.05$ , 3 df). The proportion of age-0.3 fish has not exceeded 2.4% of the total escapement in data recorded for previous years. Average lengths were smaller than the range of values observed for age-3 fish (Table 31). The male-to-female ratios were within historical ranges (Table 31). The age-0.3 fish component of the escapement had a male to female ratio of 0.6:1. Female spawners composed 49.3% of the total sockeye salmon sampled.

### **Pink Salmon**

Counts apportioned to pink salmon were 75,377 (Table 25). No estimates were available for the mainstem Susitna River above the confluence with the Yentna River.

Eighty percent of the escapement occurred in 17 d, with the midpoint occurring on 30 July (Table 32).

### **Chum and Coho Salmon**

Counts designated as to chum salmon were 21,655 (Table 25). No information was available on escapements of this species into specific spawning areas.

Counts designated as coho salmon were 57,275 (Table 25).

### ***Susitna River, Sunshine Station***

Fish wheel operational dates were 14 July through 3 August. Species composition was 53.3% sockeye, 19.0% pink, 24.0% chum, 1.5% coho, and 2.2% chinook salmon (Table 33). Of the total 4,085 salmon caught, 1,564 sockeye salmon were sampled for length and age (Tables 34, 35). Sockeye salmon sampled

were predominantly age 1.3 (68.3%) and 1.2 (21.1%). Age-1.3 fish decreased and age-1.2 fish proportionally increased over the season (Tables 11, 34;  $\alpha = 0.05$ ,  $\chi^2 = 72.85$ ,  $p < 0.05$ , 6 df). The ratio of males to females was 1.0 to 1 for age-1.3 fish and 1.2 to 1 for age-1.2 fish. Females represented 49.8% of the fish sampled.

## DISCUSSION

The 1991 field season and sonar counting operations were similar to past years. Counting conditions on all rivers were thought to be within design and operational tolerances of the Bendix side-scanning sonar system because (1) salmon passage was inshore and near the bottom during the peak of the run, (2) salmon densities were generally adequate for system adjustment, and (3) one species, sockeye salmon, composed most of the run (88%–99%) except at Yentna River (42%).

With one exception, there were no obvious relationships between changes in environmental conditions and changes in the temporal and spatial distribution of fish at each sonar site. Fish passage at Crescent River occurred primarily during the hours following high tides (Figure 11). However, there were variations from this trend when water conditions were high and turbid during the first 10 d of the counting operation. The relationship of fish passage to high tides has not been previously documented in Crescent River. Extremely low and clear water conditions prevailed during the time when the large percentage of the migration passed the counters. In past years the flow volume was greater and fluctuations between lower water levels in the morning hours and higher water levels in the afternoon and evening hours were detected. In those years the highest hourly passage rates generally could be correlated to the time of day when water levels were highest. No consistent diurnal fluctuation in water level was detected in 1991.

King and Tarbox (1990) indicated sockeye and pink salmon exhibited differential migrating behavior in the Yentna River. Sockeye salmon were proportionally higher in the fish wheel catch from 1200 through 2400 hours, and pink salmon were more frequently captured from 0600 through 1200 hours. This observation identified a potential source of error in the use of total daily adjusted fish wheel catches to apportion sonar counts. Consequently, in 1991, fish wheel operations at Yentna Station were scheduled to occur throughout the day.

In the Kenai and Kasilof Rivers, temporal distribution appeared to be related to the onset of the main body of the sockeye salmon escapement.

The Crescent River north bank counter was operated at a 30 V sensitivity (voltage output) level from 4 July through 9 July. Noise counts in sector one of the counting range, probably attributable to aeration, were eliminated by the decreased power input. Proper functioning of the counter at this increased threshold was ensured by testing with an artificial fish.

Sockeye salmon age composition was typical of previous years for stocks migrating up the Kasilof and Crescent Rivers, although the age-1.2 component was slightly higher than previously recorded. The percentage of age-1.2 fish in the Kenai River was also higher than previously recorded. Hidden Creek escapement accounted for 36.2% of age-1.2 fish (King and Davis 1991). A strong year class also contributed to the high proportion of age-1.2 fish (King and Brannian 1990). The proportion of age-1.3 fish in the Kenai River escapement was the lowest recorded since 1970. The commercial set net catch of age-1.3 sockeye salmon bound for the Kenai River was 52.5% of the total (D. Waltemyer, ADF&G, personal communication), indicating that age composition of sockeye salmon migrating into the Kenai River may have been affected by gear selectivity. Virtually all of the age-2.2 fish estimated in the Kenai River were accounted for in the Russian River escapement and sport harvest.

Pink salmon run duration (80%) in the Yentna River has ranged from 9 d to 21 d. Migratory timing has been remarkably consistent, the midpoint occurring between 27 and 30 July in 9 of the previous 10 years (Table 32).

Enumeration activities ceased on the Yentna River on 12 August. Migratory timing information could not be calculated for chum and coho salmon because migration continued past that date. Between 1981 and 1984 ranges of 69.8% to 92.0% (mean 78.7%) of the chum salmon escapement and 79.6% to 89.9% (mean 84.8%) of the coho salmon escapement were recorded by 12 August (King and Tarbox 1986). The 57,275 counts attributed to coho salmon were the highest index recorded for this species.

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Table 1. Estimated salmon escapement into the Kenai River, north and south banks combined, 1 July through 12 August, 1991.

Date	Sockeye		Pink		Coho		Chinook	
	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum
01-Jul	970	970	10	10	0	0	20	20
02-Jul	820	1,790	8	18	0	0	17	37
03-Jul	681	2,471	7	25	0	0	14	51
04-Jul	1,048	3,519	12	37	0	0	21	72
05-Jul	4,558	8,077	48	85	0	0	94	166
06-Jul	3,267	11,344	33	118	0	0	68	234
07-Jul	809	12,153	9	127	0	0	16	250
08-Jul	776	12,929	8	135	0	0	16	266
09-Jul	1,133	14,062	11	146	0	0	24	290
10-Jul	1,692	15,754	17	163	0	0	35	325
11-Jul	2,601	18,355	27	190	0	0	54	379
12-Jul	3,918	22,273	0	190	0	0	0	379
13-Jul	1,760	24,033	0	190	0	0	0	379
14-Jul	881	24,914	0	190	0	0	0	379
15-Jul	1,689	26,603	14	204	0	0	20	399
16-Jul	3,384	29,987	27	231	0	0	41	440
17-Jul	7,897	37,884	101	332	0	0	0	440
18-Jul	17,703	55,587	0	332	0	0	0	440
19-Jul	32,673	88,260	0	332	0	0	99	539
20-Jul	37,298	125,558	208	540	0	0	0	539
21-Jul	20,425	145,983	0	540	0	0	0	539
22-Jul	23,098	169,081	445	985	0	0	0	539
23-Jul	30,185	199,266	152	1,137	0	0	152	691
24-Jul	44,419	243,685	0	1,137	0	0	0	691
25-Jul	31,173	274,858	50	1,187	50	50	117	808
26-Jul	33,725	308,583	0	1,187	0	50	0	808
27-Jul	45,157	353,740	0	1,187	0	50	0	808
28-Jul	59,012	412,752	0	1,187	0	50	0	808
29-Jul	47,676	460,428	0	1,187	0	50	0	808
30-Jul	39,747	500,175	0	1,187	0	50	0	808
31-Jul	42,451	542,626	221	1,408	0	50	0	808
01-Aug	30,802	573,428	212	1,620	0	50	0	808
02-Aug	17,349	590,777	0	1,620	0	50	116	924
03-Aug	9,687	600,464	64	1,684	0	50	0	924
04-Aug	4,093	604,557	185	1,869	0	50	0	924
05-Aug	3,623	608,180	33	1,902	0	50	0	924
06-Aug	4,209	612,389	140	2,042	0	50	107	1,031
07-Aug	5,866	617,255	123	2,165	82	132	82	1,113
08-Aug	8,685	625,940	94	2,259	348	480	24	1,137
09-Aug	8,170	634,110	68	2,327	121	601	18	1,155
10-Aug	5,665	639,775	48	2,375	84	685	12	1,167
11-Aug	4,393	644,168	125	2,500	28	713	0	1,167
12-Aug	3,429	647,597	51	2,551	51	764	0	1,167

<sup>a</sup> Species composition of daily sonar counts based on fish wheel catches.

Table 2. Estimated sockeye salmon escapement recorded by side-scanning sonar in the Kenai, Kasilof, Crescent, and Susitna Rivers, 1978-1991.

Year	System			
	Kenai R. <sup>a</sup>	Kasilof R. <sup>b</sup>	Crescent R.	Susitna R. <sup>c</sup>
1978	398,900	116,600	<sup>d</sup>	94,400
1979	285,020	152,179	86,654	156,890
1980	464,038	187,154	90,863	190,866
1981	407,639	256,625	41,213	340,232
1982	619,831	180,239	58,957	215,856 <sup>e</sup> -265,332 <sup>f</sup>
1983	630,340	210,270	92,343	112,314-175,936 <sup>f</sup>
1984	344,571	231,685	118,345	194,480 <sup>e</sup> -279,446 <sup>f</sup>
1985	502,820	505,049	128,628	227,924 <sup>f</sup>
1986	501,157	275,963	20,385 <sup>g</sup>	92,077 <sup>h</sup>
1987	1,596,870	249,246	118,896	66,053 <sup>h</sup>
1988	1,021,500	204,000 <sup>i</sup>	57,716	52,347 <sup>h</sup>
1989	1,599,959	158,206	71,064	96,269 <sup>h</sup>
1990	659,520	144,136	52,238	140,290 <sup>h</sup>
1991	647,597	238,269	44,578	109,632 <sup>h</sup>

<sup>a</sup> Includes counts after 22 June (1978-87) and after 1 July (1988-90).

<sup>b</sup> Includes counts or estimates from designated early period (prior to 15 June).

<sup>c</sup> Sonar counts from Susitna Station unless otherwise indicated.

<sup>d</sup> No counts conducted.

<sup>e</sup> Sonar counts from Yentna Station and Susitna Station east bank.

<sup>f</sup> Sonar counts from Yentna Station and mark/recapture estimate from Sunshine Station.

<sup>g</sup> Counts through 16 July only.

<sup>h</sup> Counts from Yentna Station only (1986-91).

<sup>i</sup> Combined counts from weirs on Bear and Glacier Flats Creeks and surveys of remaining spawning streams.



Table 3. Late-run Kenai River sockeye salmon escapement summary, 1968-1991.

Year	Estimated Escapement at Sonar Site <sup>a</sup>	Russian River Sport Harvest <sup>b</sup>	Kenai River Mainstem Sport Harvest <sup>b</sup>	Estimated Total Harvest Above Sonar Site <sup>c</sup>	Sonar Count Less Sport Harvest <sup>d</sup>
1968	88,000	5,820			
1969	53,000	1,150			
1970	73,000	600			
1971		10,730			
1972	318,000	16,050			
1973	367,000	8,930			
1974	161,000	8,500	8,030	16,530 <sup>e</sup>	144,470
1975	142,000	8,390	5,110	13,500	128,500
1976	380,000	13,700	13,140	26,840	353,160
1977	708,000	27,440	16,933	44,373	663,627
1978	398,900	24,530	24,542	49,072	349,828
1979	285,020	26,840	12,328	39,158	245,862
1980	464,038	33,500	18,592	52,082	411,956
1981	407,639	23,720	14,450	38,171	369,468
1982	619,831	10,320	38,400	48,718	571,113
1983	630,340	16,000	48,310	64,306	566,034
1984	344,571	21,970	11,160	33,250	311,321
1985	502,820	58,410	40,440	98,850	403,970
1986	501,157	30,810	47,920	78,730	422,427
1987	1,596,871	40,580	148,300	188,880	1,407,991
1988	1,021,469	19,540	91,770	111,310	910,159
1989	1,599,959	55,210	165,340	220,550	1,379,409
1990	659,520	52,984	87,575 <sup>f</sup>	140,559	518,961
1991	647,597	31,449	107,500 <sup>g</sup>	184,716 <sup>g</sup>	462,881

<sup>a</sup> Bendix Corp. multiple transducer sonar 1968-1977, side-scanning sonar 1978-1991.

<sup>b</sup> Data from Sport Fish Division Statewide Harvest estimate. Mainstem harvest above the Soldotna bridge (and sonar site) only.

<sup>c</sup> Combined Russian River and mainstem (above bridge) harvests.

<sup>d</sup> Considered estimate of spawners above sonar site.

<sup>e</sup> Cross et al. (1983): 1974-1980.

<sup>f</sup> Preliminary estimate: Nelson (1991b).

<sup>g</sup> Includes 77,216 harvest at Hidden Creek weir: Kyle (1991).

Table 4. Late-run sockeye salmon escapement counts in eight index areas, Kenai River drainage, 1969-1991.

Year	Railroad Creek <sup>b</sup>	Johnson Creek <sup>b</sup>	Carter-Moose Creek <sup>b</sup>	Ptarmigan Creek <sup>b</sup>	Tern (Mud) Lake <sup>b</sup>	Quartz Creek	Hidden Lake <sup>c</sup>	Russian River <sup>a</sup>		Total Index Area Escapement
								Above Weir	Below Weir	
1969	100	75	598	5	487	487	500	28,920	1,100	32,272
1970	99	118	348	7	561	200	323	28,200	220	30,076
1971	194	160	3,201	45	1,370	808	1,958	54,430	10,000	72,166
1972	700	150	3,400		1,200		4,956	79,000	6,000	95,406
1973	521	1,714	660	1,041	1,731	3,173	690	24,970	6,690	41,190
1974		46	939	558		255	1,150	24,650	2,210	29,808
1975	522	105	1,278	186	1,214	1,068	1,375	31,970	630	38,348
1976	1,032		5,558		1,548	3,372	4,860	31,950	3,470	51,790
1977	1,262	450	6,515	1,513	2,230	3,037	1,055	21,410	17,090	54,562
1978	1,749	780	1,933	3,529	1,126	10,627	4,647	32,760	18,330	75,481
1979		588	3,986	523	1,693	277	5,762	87,920	3,920	104,669
1980	1,259	253	4,879	5,752	2,575	7,982	27,448	83,980	3,220	137,348
1981	1,276	142	4,370	1,421	3,402	5,998	15,939	44,530	4,160	81,238
1982	2,518	498	4,752	7,525	4,300	70,540 <sup>d</sup>	8,648	30,790	45,000	174,571
1983	1,289	338	1,819	9,709		73,345	11,297	34,040	44,000	175,837
1984	2,090	939	5,927	18,000	2,728	37,659	27,792	92,660	3,000	190,795
1985	2,884	151	5,928	26,879			24,784	136,970	8,650	206,246
1986	600	245	1,659				17,530	40,420	6,022	66,476
1987	736	74	625	14,187		45,400	43,487	53,930	76,732	235,171
1988	1,990	1,243	1,607	31,696			50,907	42,480	28,840	158,763
1989	4,959	2,276	5,958	3,484			7,770	138,320	28,480	191,247
1990			2,306	3,230			77,959	83,336	11,760	178,591
1991			750 <sup>e</sup>	2,764 <sup>e</sup>	1,750		35,676	78,175	22,267	141,382

<sup>a</sup> Nelson (1991)

<sup>b</sup> United States Department of Agriculture, Forest Service, Seward, Alaska (1984-90).

<sup>c</sup> Weir count: 1971, 1973, 1976-89 (F.R.E.D. Division); 1990 (Cook Inlet Aquaculture Assoc.).

<sup>d</sup> F.R.E.D. Division weir count (1982-83).

<sup>e</sup> Ptarmigan Creek survey conducted on lower 1.5 miles, Moose Creek survey conducted on lower 1.0 mile.

Table 5. Cumulative proportion by date of late-run sockeye salmon counts recorded in the Kenai River, 1982-1991.<sup>a</sup>

Date	Cumulative Proportion <sup>b</sup>									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
22-Jun	0.002	0.001	0.003	0.001	0.001	0.001				
23-Jun	0.003	0.001	0.007	0.002	0.002	0.002				
24-Jun	0.004	0.002	0.010	0.003	0.003	0.002				
25-Jun	0.004	0.003	0.012	0.004	0.004	0.002				
26-Jun	0.005	0.004	0.013	0.005	0.004	0.003				
27-Jun	0.006	0.005	0.015	0.006	0.005	0.004				
28-Jun	0.007	0.006	0.017	0.007	0.006	0.005				
29-Jun	0.007	0.006	0.018	0.009	0.007	0.006				
30-Jun	0.008	0.007	0.021	0.010	0.008	0.007				
01-Jul	0.009	0.007	0.023	0.014	0.009	0.007	0.000	0.000	0.001	0.001
02-Jul	0.010	0.008	0.024	0.016	0.010	0.008	0.000	0.001	0.001	0.003
03-Jul	0.011	0.008	0.025	0.017	0.011	0.008	0.001	0.001	0.003	0.004
04-Jul	0.011	0.009	0.027	0.019	0.012	0.008	0.001	0.001	0.010	0.005
05-Jul	0.012	0.009	0.029	0.021	0.013	0.009	0.001	0.002	0.019	0.012
06-Jul	0.012	0.009	0.031	0.024	0.014	0.009	0.002	0.006	0.029	0.018
07-Jul	0.013	0.010	0.032	0.026	0.016	0.009	0.003	0.011	0.036	0.019
08-Jul	0.013	0.010	0.036	0.030	0.016	0.010	0.003	0.014	0.044	0.020
09-Jul	0.015	0.011	0.044	0.032	0.016	0.010	0.003	0.017	0.049	0.022
10-Jul	0.016	0.013	0.054	0.033	0.017	0.010	0.011	0.021	0.050	0.024
11-Jul	0.016	0.017	0.063	0.036	0.017	0.011	0.063	0.024	0.052	0.028
12-Jul	0.017	0.021	0.067	0.038	0.018	0.011	0.088	0.046	0.054	0.034
13-Jul	0.019	0.041	0.071	0.039	0.020	0.015	0.141	0.100	0.057	0.037
14-Jul	0.021	0.085	0.073	0.048	0.044	0.018	0.185	0.162	0.060	0.038
15-Jul	0.026	0.174	0.076	0.066	0.057	0.033	0.222	0.211	0.064	0.041
16-Jul	0.047	0.242	0.112	0.104	0.068	0.044	0.274	0.242	0.068	0.046
17-Jul	0.067	0.297	0.173	0.111	0.081	0.052	0.303	0.290	0.138	0.058
18-Jul	0.182	0.437	0.307	0.114	0.095	0.058	0.340	0.347	0.279	0.086
19-Jul	0.322	0.566	0.363	0.115	0.114	0.070	0.375	0.367	0.344	0.136
20-Jul	0.474	0.695	0.406	0.116	0.126	0.142	0.409	0.421	0.400	0.194
21-Jul	0.563	0.766	0.464	0.120	0.194	0.237	0.464	0.500	0.457	0.225
22-Jul	0.598	0.796	0.555	0.178	0.300	0.322	0.569	0.566	0.473	0.261
23-Jul	0.642	0.813	0.652	0.291	0.359	0.409	0.679	0.639	0.518	0.308
24-Jul	0.681	0.833	0.720	0.463	0.426	0.493	0.744	0.679	0.576	0.376
25-Jul	0.722	0.844	0.781	0.574	0.525	0.575	0.785	0.698	0.675	0.424
26-Jul	0.752	0.861	0.833	0.693	0.689	0.646	0.812	0.729	0.719	0.477
27-Jul	0.842	0.865	0.867	0.753	0.814	0.700	0.827	0.774	0.729	0.546
28-Jul	0.883	0.872	0.897	0.822	0.874	0.747	0.836	0.806	0.744	0.637
29-Jul	0.903	0.878	0.913	0.864	0.910	0.774	0.844	0.831	0.796	0.711
30-Jul	0.918	0.882	0.921	0.897	0.961	0.797	0.847	0.846	0.846	0.772
31-Jul	0.931	0.891	0.928	0.911	1.000	0.839	0.850	0.856	0.867	0.838
01-Aug	0.940	0.906	0.933	0.919		0.879	0.854	0.875	0.879	0.885
02-Aug	0.946	0.916	0.937	0.922		0.907	0.859	0.888	0.896	0.912
03-Aug	0.951	0.920	0.943	0.925		0.925	0.863	0.899	0.932	0.927
04-Aug	0.955	0.934	0.948	0.929		0.939	0.873	0.908	0.963	0.934
05-Aug	1.000	0.964	0.956	0.931		0.952	0.894	0.916	0.978	0.939
06-Aug		0.977	0.960	0.935		0.962	0.914	0.930	0.991	0.946
07-Aug		0.983	0.963	0.938		0.970	0.933	0.949	1.000	0.953
08-Aug		0.989	0.969	0.943		0.976	0.944	0.960		0.967
09-Aug		0.993	1.000	0.947		0.981	0.953	0.966		0.979
10-Aug		0.996		0.953		0.988	1.000	0.974		0.988
11-Aug		0.999		0.960		0.994		0.985		0.995
12-Aug		1.000		1.000		0.998		0.990		1.000

- Continued -

Table 5. (p. 2 of 2)

Date	Cumulative Proportion <sup>b</sup>									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
13-Aug						1.000		0.994		
14-Aug								0.998		
15-Aug								1.000		
Midpoint	7/21	7/19	7/22	7/25	7/25	7/25	7/22	7/21	7/23	7/27
No. days <sup>c</sup> for 80%	12	18	14	16	12	14	25	23	18	15

<sup>a</sup> Number of days for 80% for years not included in table: 1979-12; 1980-6; and 1981-18.

<sup>b</sup> Proportion accrued on last day (1981, 1982, 1984-1986, 1988) represents that portion of the escapement estimated after termination of enumeration activities.

<sup>c</sup> Inclusive dates: 10% - 90%.

Table 6. Distribution of sockeye salmon escapement by bank recorded by side-scanning sonar in the Kenai, Kasilof, Crescent, and Yentna Rivers, 1979-1991.

Year	Percentage of Total Fish Targets							
	Kenai River		Kasilof River		Crescent River		Yentna River	
	North Bank	South Bank	North Bank	South Bank	North Bank	South Bank	North Bank	South Bank
1979	72	28	53	47				
1980	61	39	52	48	49	51		
1981	72	28	69	31	57	43		
1982	39	61	73	27	54	46		
1983	42	58	51	49	39	61		
1984	65	35	56	44	71	29		
1985	54	46	70	30	70	30	9	91
1986	62	38	57	43	84	16	32	68
1987	48	52	55	45	64	34	10	90
1988	47	53	32	68	53	47	8	92
1989	57	43	39	61	52	48	12	88
1990	62	38	29	71	44	56	2	98
1991	73	27	39	61	33	67	8	92

Table 7. Summary of sonar counts by sector from the Kenai, Kasilof, Crescent and Yentna Rivers, 1991.

River	Bank	Dates	Sector <sup>a</sup>												Total Counts
			1	2	3	4	5	6	7	8	9	10	11	12	
Kenai	north	7/01-7/13	4.3	9.5	8.0	10.7	13.3	10.3	18.6	9.9	6.8	6.2	1.1	1.2	15,004
		7/14-8/02	3.0	8.1	8.5	13.2	14.9	12.8	9.7	11.1	8.1	4.5	3.3	2.9	422,632
		8/03-8/12	3.7	11.1	11.8	5.5	12.8	15.2	14.1	9.3	4.1	3.7	5.7	2.9	36,847
		all	3.1	8.4	8.8	12.5	14.7	12.9	10.3	10.9	7.7	4.5	3.4	2.9	474,483
Kenai	south	7/01-7/18	11.2	5.7	25.6	15.0	16.0	11.1	4.0	2.5	0.4	1.0	2.4	5.1	11,567
		7/19-8/01	7.8	41.8	34.7	7.5	1.5	0.6	0.2	0.3	0.5	1.5	1.9	1.9	133,280
		8/02-8/12	12.6	58.2	18.9	1.2	0.9	0.7	0.1	0.2	0.4	2.0	2.5	2.2	31,618
		all	8.9	42.3	31.2	6.8	2.3	1.3	0.4	0.4	0.4	1.6	2.0	2.2	176,465
Kasilof	north	6/15-6/25	12.0	15.8	17.0	11.3	11.8	7.4	3.9	4.4	3.8	2.8	3.8	5.9	13,860
		6/26-7/10	53.2	22.3	11.2	5.8	3.0	2.3	0.7	0.6	0.3	0.2	0.1	0.4	28,968
		7/11-7/28	71.9	12.1	2.5	1.8	1.6	1.5	0.9	1.4	1.0	1.5	1.6	2.2	44,742
		7/29-8/08	58.1	10.3	3.0	2.9	3.7	2.2	1.9	2.1	1.4	2.7	3.9	7.7	6,012
		all	56.4	15.7	7.4	4.5	3.7	2.7	1.3	1.6	1.2	1.4	1.6	2.5	93,591
Kasilof	south	6/15-7/02	9.7	28.9	22.0	6.1	1.6	0.6	3.7	2.9	2.6	4.3	6.8	10.9	38,416
		7/03-7/22	16.5	46.1	20.5	5.8	2.0	0.7	1.8	1.5	0.9	1.2	1.2	1.9	62,367
		7/23-7/29	23.1	22.0	22.7	12.7	6.2	2.5	1.8	1.3	0.7	1.2	1.8	4.1	32,748
		7/30-8/08	31.3	27.0	15.7	9.4	4.7	2.6	1.4	1.5	1.0	1.4	1.3	2.6	11,147
		all	17.4	34.6	21.0	7.7	3.0	1.2	2.3	1.8	1.3	2.0	2.8	4.8	144,678
Crescent	north	all	46.0	47.7	5.1	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33,989
Crescent	south	all	16.4	39.4	40.2	2.7	0.8	0.2	0.1	0.0	0.0	0.0	0.0	0.0	17,080
Yentna	north	all	43.9	30.2	13.9	4.9	2.0	1.1	0.9	0.6	0.4	0.4	1.1	0.6	44,744
Yentna	south	all	29.0	44.7	16.1	4.0	1.2	0.4	1.3	0.9	0.5	0.6	0.6	0.7	219,182

<sup>a</sup>Counts by sector and hour by day from King and Davis (1991).

Table 8. Daily adjusted fish wheel catch by species for the Kenai River, 7 July through 12 August, 1991.

Date	Hours Open <sup>a</sup>	Sockeye		Pink		Coho		Chinook	
		Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>
07-Jul	25.00	7	7	1	1	0	0	0	0
08-Jul	23.00	22	29	1	2	0	0	1	1
09-Jul	23.50	27	56	0	2	0	0	0	1
10-Jul	21.50	48	104	0	2	0	0	1	2
11-Jul	16.00	89	193	0	2	0	0	2	4
12-Jul	23.25	73	266	0	2	0	0	0	4
13-Jul	22.25	77	343	0	2	0	0	0	4
14-Jul	23.25	8	351	0	2	0	0	0	4
15-Jul	28.00	33	384	2	4	0	0	0	4
16-Jul	18.50	215	599	0	4	0	0	3	7
17-Jul	18.25	314	913	4	8	0	0	0	7
18-Jul	3.75	1,715	2,628	0	8	0	0	0	7
19-Jul	3025	2,311	4,939	0	8	0	0	7	14
20-Jul	6.00	2,152	7,091	12	20	0	0	0	14
21-Jul	1.50	2,256	9,347	0	20	0	0	0	14
22-Jul	4.00	1,068	10,415	24	44	0	0	0	14
23-Jul	2.50	1,987	12,402	10	54	0	0	10	24
24-Jul	1.25	3,974	16,376	0	54	0	0	0	24
25-Jul	4.25	1,864	18,240	3	57	3	3	7	31
26-Jul	2.25	1,248	19,488	0	57	0	3	0	31
27-Jul	0.25	18,240	37,728	0	57	0	3	0	31
28-Jul	.025	18,912	56,640	0	57	0	3	0	31
29-Jul	2.00	3,648	60,288	0	57	0	3	0	31
30-Jul	4.50	2,757	63,045	0	57	0	3	0	31
31-Jul	3.75	1,152	64,197	6	63	0	3	0	31
01-Aug	2.75	2,479	66,676	17	80	0	3	0	31
02-Aug	1.50	2,384	69,060	0	80	0	3	16	47
03-Aug	2.00	1,208	70,268	8	88	0	3	0	47
04-Aug	4.50	709	70,977	32	120	0	3	0	47
05-Aug	4.50	549	71,526	5	125	0	3	0	47
06-Aug	9.25	392	71,918	13	138	0	3	10	57
07-Aug	19.00	237	72,155	6	144	4	7	4	61
08-Aug	22.00	373	72,528	4	148	15	22	1	62
09-Aug			72,528		148		22		62
10-Aug	18.00	473	73,001	4	152	7	29	1	63
11-Aug	10.75	315	73,316	9	161	2	31	0	63
12-Aug	12.75	134	73,450	2	163	2	33	0	63

<sup>a</sup> Fish wheel catch adjusted for 24 h: (daily catch \* 24 h)/hours open.

<sup>b</sup> Actual total catch by species: 6,832 sockeye salmon; 49 pink salmon; 23 coho salmon; 19 chinook salmon.

Table 9. Length composition of the major age classes of sockeye salmon collected in the Kenai River, 1980-1991<sup>a</sup>.

Year	Age Class	Male			Female			Total			Ratio Male/Female
		Ave Length (mm)	Stdnd Error	Sample Size	Ave Length (mm)	Stdnd Error	Sample Size	Ave Length (mm)	Stdnd Error	Sample Size	
1980	1.2	482	4	168	494	4	100	486		268	1.7:1
1981		493	6	85	513	6	73	502		158	1.2:1
1982		483	9	70	505	13	32	490	10	63	2.2:1
1983		524	9	25	520	6	30	522	5	55	0.8:1
1984		474	3	280	473	4	196	474	2	476	1.4:1
1985		492	3	184	490	3	186	491	2	370	1.0:1
1986		488	4	155	492	6	96	489	4	251	1.6:1
1987		514	8	39	503	5	56	507	5	95	0.7:1
1988		522	8	79	511	4	84	516	4	163	0.9:1
1989		493	6	114	494	4	92	493	4	206	1.2:1
1990		474	0	168	478	0	127	476	0	295	1.3:1
1991		488	2	613	497	13	577	492	6	1,190	1.1:1
1980	1.3	580	3	180	561	2	192	570		372	0.9:1
1981		590	2	290	569	1	430	577		720	0.7:1
1982		596	2	723	572	1	841	583	2	1,564	0.9:1
1983		598	2	215	577	1	269	586	1	484	0.8:1
1984		582	2	385	559	1	395	571	1	780	1.0:1
1985		575	2	496	552	1	824	560	1	1,320	0.6:1
1986		584	3	112	564	2	200	571	2	312	0.6:1
1987		605	2	183	586	1	401	592	1	584	0.5:1
1988		598	1	428	572	2	624	583	1	1,052	0.7:1
1989		600	1	831	575	1	881	587	1	1,712	0.9:1
1990		586	0	358	559	0	318	574	0	676	1.1:1
1991		561	2	357	539	1	441	549	1	798	0.8:1
1984	2.2	505	4	116	508	3	159	507	2	275	0.7:1
1985		513	4	132	513	3	196	513	2	328	0.7:1
1980	2.3	589	3	67	579	3	80	584		147	0.8:1
1982		598	5	46	580	8	21	592	6	67	2.2:1
1983		595	4	25	582	4	36	587	3	61	0.7:1
1984		570	2	210	557	2	192	564	2	402	1.1:1
1985		570	3	106	555	2	129	562	2	235	0.8:1
1986		585	5	52	568	3	89	575	3	142	0.6:1
1988		596	3	53	577	3	92	584	2	145	0.6:1
1989		600	3	112	579	2	108	589	2	220	1.0:1
1990		589	0	177	568	0	132	580	0	309	1.3:1
1991		572	2	153	543	3	139	558	2	292	1.1:1

<sup>a</sup> Length measured from mid-eye to fork-of-tail.



Table 10. Age composition of sockeye salmon collected in the Kenai River, 1970-1991.

Sample Period	Percentage Composition by Age Class <sup>a</sup>								Sample Size
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	Other	
7/01-7/22	0.0	42.5	35.3	0.3	0.9	6.8	13.9	1.1	1,170
7/23-7/27	0.0	41.8	34.8	0.0	0.0	3.0	14.2	6.3	431
7/28-7/31	0.0	52.1	31.2	0.2	0.4	5.2	10.2	0.7	461
8/01-8/12	0.7	62.0	20.7	0.0	1.8	9.3	5.0	0.5	440
Seasonal Summary									
1970	tr	10.0	17.0	tr	26.0	25.0	15.0	6.0	225
1971	0.0	8.0	39.0	1.0	3.0	38.0	11.0	0.0	168
1972	0.0	21.0	34.0	0.0	0.0	23.0	20.0	0.0	403
1973	0.0	5.0	68.0	1.0	1.0	8.0	16.0	0.0	632
1974	2.0	18.0	46.0	0.0	3.0	18.0	12.0	0.0	295
1975	2.0	10.0	36.0	2.0	4.0	31.0	14.0	1.0	162
1976	1.0	46.0	20.0	0.0	2.0	22.0	8.0	1.0	948
1977	0.0	6.0	76.0	1.0	tr	7.0	10.0	0.0	1,265
1978	0.0	2.5	86.7	0.0	0.0	4.9	5.4	tr	811
1979	tr	20.2	61.1	0.0	0.0	11.8	6.2	tr	601
1980	0.0	27.7	45.1	0.0	0.0	16.2	10.1	tr	715
1981	0.0	16.2	70.9	0.0	0.0	8.1	4.8	0.0	1,757
1982	0.1	5.8	87.5	tr	0.0	2.9	3.7	0.0	1,787
1983	0.4	8.2	79.1	0.2	0.5	2.2	8.9	0.4	1,765
1984	0.2	23.4	38.2	3.5	0.6	12.8	19.2	2.2	2,364
1985	0.1	15.9	56.4	0.3	0.1	14.7	11.4	1.1	2,201
1986	0.0	31.8	39.5	0.7	0.3	8.2	18.0	1.5	789
1987	0.0	12.8	78.4	0.1	0.0	3.2	5.2	0.3	745
1988	0.3	11.6	74.2	0.4	0.2	3.1	10.2	0.1	1,420
1989	0.1	9.1	75.3	1.0	0.5	4.1	9.7	0.2	2,275
1990	0.6	21.6	41.4	0.6	0.3	13.7	21.1	0.8	1,513
1991	0.2	48.2	31.6	0.1	0.5	5.7	11.4	2.7	2,504

<sup>a</sup> Percentages weighted by total numbers in the escapement: 1978 (Bethe et al. 1980), 1979-1982, 1984-1991.

Table 11. Summary of chi-square analysis of temporal change in sockeye salmon age composition in the Kenai, Kasilof, Yentna and Susitna Rivers, 1991.

River	Number of Periods	Dates	Age Classes	Chi-square Value						Hypothesis <sup>a</sup>
				Calculated	Alpha	DF	Tabled		Significant?	
							Value			
Kenai	4	7/01-8/12	1.2, 1.3, 2.3	21.73	0.05	6	12.59	yes	reject	
Kenai	2	7/01-7/27	1.2, 1.3, 2.3	0.05	0.05	2	5.99	no	accept	
Kenai	2	7/23-7/31	1.2, 1.3, 2.3	8.58	0.05	2	5.99	yes	reject	
Kenai	2	7/28-8/12	1.2, 1.3, 2.3	20.72	0.05	2	5.99	yes	reject	
Kasilof	4	6/15-8/08	1.2, 1.3, 2.2	269.87	0.05	6	12.59	yes	reject	
Kasilof	2	6/15-7/10	1.2, 1.3, 2.2	80.66	0.05	2	5.99	yes	reject	
Kasilof	2	7/01-7/20	1.2, 1.3, 2.2	43.70	0.05	2	5.99	yes	reject	
Kasilof	2	7/11-8/08	1.2, 1.3, 2.2	45.71	0.05	2	5.99	yes	reject	
Yentna	3	7/07-8/12	0.3, 1.2, 1.3, 2.3	12.10	0.05	6	12.59	no	accept	
Yentna	2	7/07-7/30	0.3, 1.2, 1.3, 2.3	5.82	0.05	3	7.81	no	accept	
Yentna	2	7/23-8/12	0.3, 1.2, 1.3, 2.3	16.09	0.05	3	7.81	yes	reject	
Susitna	4	7/15-7/23	1.2, 1.3, 2.3	72.85	0.05	6	12.59	yes	reject	
Susitna	2	7/15-7/26	1.2, 1.3, 2.3	51.05	0.05	3	7.81	yes	reject	
Susitna	2	7/24-7/30	1.2, 1.3, 2.3	2.88	0.05	3	7.81	no	accept	
Susitna	2	7/28-8/12	1.2, 1.3, 2.3	7.60	0.05	3	7.81	no	accept	

<sup>a</sup>Hypothesis: Age class proportions do not change over time.

Table 12. Estimated sockeye salmon escapement into the Kasilof River, north and south banks combined, 15 June through 8 August, 1991.

Date	Daily	Cum	Date	Daily	Cum
15-Jun	496	496	13-Jul	322	116,668
16-Jun	1,588	2,084	14-Jul	461	117,129
17-Jun	1,415	3,499	15-Jul	3,919	121,048
18-Jun	1,109	4,608	16-Jul	3,574	124,622
19-Jun	1,552	6,160	17-Jul	5,538	130,160
20-Jun	1,587	7,747	18-Jul	16,463	146,623
21-Jun	2,683	10,430	19-Jul	8,128	154,751
22-Jun	2,920	13,350	20-Jul	2,862	157,613
23-Jun	3,300	16,650	21-Jul	4,150	161,763
24-Jun	3,614	20,264	22-Jul	7,362	169,125
25-Jun	2,553	22,817	23-Jul	9,743	178,868
26-Jun	3,419	26,236	24-Jul	7,169	186,037
27-Jun	5,951	32,187	25-Jul	7,660	193,697
28-Jun	8,585	40,772	26-Jul	8,493	202,190
29-Jun	7,814	48,586	27-Jul	7,617	209,807
30-Jun	8,112	56,698	28-Jul	7,877	217,684
01-Jul	5,103	61,801	29-Jul	5,208	222,892
02-Jul	3,797	65,598	30-Jul	2,855	225,747
03-Jul	4,314	69,912	31-Jul	2,021	227,768
04-Jul	10,575	80,487	01-Aug	905	228,673
05-Jul	11,348	91,835	02-Aug	1,524	230,197
06-Jul	3,459	95,294	03-Aug	1,659	231,856
07-Jul	1,542	96,836	04-Aug	1,087	232,943
08-Jul	2,508	99,344	05-Aug	884	233,827
09-Jul	3,304	102,648	06-Aug	1,404	235,231
10-Jul	4,683	107,331	07-Aug	1,676	236,907
11-Jul	6,388	113,719	08-Aug	1,362	238,269
12-Jul	2,627	116,346			

Table 13. Kasilof River sockeye salmon escapement summary, 1968-1991.

Year	Escapement Estimated by Sonar Count <sup>a</sup>	Fish used for Artificial Propagation of Tustumena Lake <sup>b</sup>	Sonar Count Less Egg Take <sup>c</sup>
1968	89,000		
1969	46,000		
1970	38,000		
1971	--		
1972	113,000		
1973	40,000		
1974	70,000	205	69,795
1975	48,000	3,365	44,635
1976	139,000	5,463	133,537
1977	155,300	1,794	153,506
1978	116,600	6,681	109,919
1979	152,179	3,024	149,155
1980	187,154	6,030	181,124
1981	256,625	9,700	246,925
1982	180,239	11,571	168,668
1983	210,271	9,903	200,368
1984	231,685	11,141	220,544
1985	505,049	11,280	493,769
1986	275,963	11,952	264,011
1987	249,246	9,865	239,381
1988	204,000 <sup>d</sup>	9,387	195,000
1989	158,206	7,367	150,839
1990	144,136	6,831	137,305
1991	238,269	8,850	229,419

<sup>a</sup> Multiple transducer sonar counts rounded to the nearest thousand (1968-78) from Namtvedt et al. (1979).

<sup>b</sup> From Cross et al. (1983): 1974-1980, FRED Div., Soldotna, Alaska files: 1981-91.

<sup>c</sup> Considered estimate of natural spawners above sonar site.

<sup>d</sup> Combined counts from weirs on Bear and Glacier Flats Creeks and surveys of remaining spawning streams.

Table 14. Distribution (percentage of total index counts) of sockeye salmon in the major tributary systems of Tustumena Lake, 1975-1991.<sup>a</sup>

Year	Nikolai Creek	Moose Creek	Bear Creek	Glacier Flat Creek	Other
1975	10.2	5.9	49.9	25.9	8.1
1976	13.8	16.2	59.8	8.2	2.0
1977	25.8	14.7	51.5	5.1	2.9
1978	34.3	15.9	43.5	4.7	1.6
1979	27.1	11.5	51.0	7.9	2.5
1980	5.8	9.1	73.1	9.0	3.0
1981	21.0	7.6	43.8	23.3	4.3
1982	15.8	12.6	48.2	16.3	7.1
1983	12.0	13.5	43.4	27.1	4.0
1984	5.1	8.7	33.6	47.1	5.5
1985	6.0	3.0	43.0	44.0	4.0
1986	5.9	10.4	50.8	29.9	3.0
1987	5.3	10.4	42.2	36.2	5.9
1988	5.3	8.7	62.5	19.6	3.8
1989	4.5	15.9	58.6	18.8	2.3
1990	8.4	21.1	51.9	16.1	2.6
1991	17.4	14.6	55.6	9.7 <sup>b</sup>	2.6

<sup>a</sup> Combined counts from weirs on Bear and Glacier Flat Creek and surveys of remaining spawning streams.

<sup>b</sup> Weir was not operated on Glacier Flat Creek in 1991.

Table 15. Peak sockeye salmon escapement counts in seven index areas, Kasilof River drainage, 1975-1991.

Year	Nikolai Creek <sup>a</sup>	Crystal Creek <sup>a</sup>	Clear Creek <sup>a</sup>	Glacier Flat Creek <sup>b</sup>	Seepage Creek <sup>a</sup>	Moose Creek <sup>a</sup>	Bear Creek <sup>b</sup>	Total Index Count <sup>c</sup>
1975	5,700	400	300	14,400	3,700	3,300	27,700	55,500
1976	12,000	800	300	7,100	800	14,000	51,800	86,800
1977	29,100	600	1,800	5,800	800	16,600	58,000	112,700
1978	34,200	200	200	4,700	1,100	15,900	43,400	99,700
1979	19,100	500	400	5,600	800	8,100	35,900	70,400
1980	10,000	1,000	2,100	15,500	1,800	15,600	125,000	171,000
1981	36,000	860	2,978	40,071	3,376	12,968	75,117	171,370
1982	16,800	1,785	4,183	17,348	1,638	13,400	51,350	106,504
1983	17,100	1,657	860	38,776	3,305	19,245	61,957	142,900
1984	8,270	141	2,619	76,217	6,250	13,999	54,328	161,824
1985 <sup>d</sup>	17,500	800	3,500	121,400	5,700	9,200	120,400	278,500
1986 <sup>d</sup>	11,900	1,400	2,700	60,600	2,000	21,200	102,900	202,700
1987	9,002	1,385	7,704	61,000	791	17,601	71,250	168,733
1988	10,841	593	5,809	40,015	1,387	17,727	127,532	203,904
1989	4,818	1,033	559	20,156	940	17,058	62,941	107,505
1990	7,474	879	220	14,355	1,217	18,800	46,300	89,245
1991	21,582	391	1,223	12,068	1,661	18,105	68,880	123,910

<sup>a</sup> Commercial Fisheries Division stream survey counts (1975-85); F.R.E.D. Division stream survey counts (1986-91).

<sup>b</sup> F.R.E.D. Division weir count, 1980-1991 (weir at Glacier Flats Creek was removed prior to end of run, 1991 count is result of foot survey).

<sup>c</sup> Counts standardized to common unit for years when entire stream not surveyed. Relative abundance per section (when entire system was surveyed) was used to extrapolate for years when only a portion of the stream was surveyed (1975-1980). Numbers rounded to nearest hundred fish.

<sup>d</sup> Flagg (1986). Numbers rounded to nearest hundred fish.

Table 16. Cumulative proportion by date of sockeye salmon counts recorded in the Kasilof River, 1981-1991.<sup>a</sup>

Date	Cumulative Proportion <sup>b</sup>									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
09-Jun			0.007							
10-Jun	0.001	0.045	0.008							
11-Jun	0.003	0.046	0.009							
12-Jun	0.005	0.048	0.011	0.002	0.037	0.044				
13-Jun	0.007	0.050	0.012	0.003	0.041	0.051				
14-Jun	0.008	0.051	0.013	0.003	0.045	0.062	0.009			
15-Jun	0.010	0.053	0.015	0.004	0.048	0.073	0.014	0.001	0.002	
16-Jun	0.011	0.056	0.018	0.004	0.053	0.091	0.018	0.002	0.004	0.009
17-Jun	0.013	0.058	0.020	0.005	0.059	0.106	0.021	0.004	0.006	0.015
18-Jun	0.015	0.060	0.022	0.005	0.062	0.120	0.025	0.006	0.008	0.019
19-Jun	0.027	0.063	0.025	0.006	0.066	0.146	0.028	0.007	0.009	0.026
20-Jun	0.035	0.065	0.031	0.007	0.068	0.171	0.032	0.011	0.010	0.033
21-Jun	0.040	0.068	0.039	0.007	0.071	0.190	0.038	0.014	0.012	0.044
22-Jun	0.043	0.070	0.048	0.008	0.073	0.198	0.046	0.016	0.014	0.056
23-Jun	0.045	0.074	0.058	0.009	0.074	0.201	0.053	0.019	0.015	0.070
24-Jun	0.049	0.076	0.069	0.012	0.075	0.206	0.065	0.021	0.017	0.085
25-Jun	0.053	0.078	0.075	0.015	0.077	0.212	0.077	0.024	0.019	0.096
26-Jun	0.055	0.080	0.080	0.017	0.079	0.218	0.089	0.031	0.022	0.110
27-Jun	0.058	0.082	0.089	0.019	0.082	0.222	0.105	0.037	0.025	0.135
28-Jun	0.061	0.085	0.099	0.022	0.085	0.227	0.133	0.046	0.030	0.171
29-Jun	0.064	0.090	0.111	0.025	0.095	0.238	0.157	0.057	0.037	0.204
30-Jun	0.069	0.110	0.123	0.029	0.121	0.249	0.173	0.074	0.051	0.238
01-Jul	0.078	0.153	0.136	0.035	0.153	0.267	0.184	0.098	0.065	0.259
02-Jul	0.091	0.165	0.150	0.039	0.180	0.297	0.189	0.153	0.076	0.275
03-Jul	0.104	0.188	0.157	0.044	0.198	0.317	0.196	0.178	0.091	0.293
04-Jul	0.115	0.212	0.178	0.056	0.215	0.334	0.224	0.183	0.120	0.338
05-Jul	0.122	0.221	0.217	0.066	0.228	0.357	0.235	0.225	0.158	0.385
06-Jul	0.129	0.231	0.243	0.071	0.245	0.385	0.255	0.277	0.193	0.400
07-Jul	0.136	0.240	0.263	0.078	0.257	0.403	0.306	0.321	0.209	0.406
08-Jul	0.145	0.247	0.304	0.095	0.261	0.422	0.329	0.346	0.235	0.417
09-Jul	0.156	0.263	0.358	0.103	0.269	0.438	0.382	0.378	0.254	0.431
10-Jul	0.164	0.294	0.391	0.114	0.289	0.450	0.457	0.404	0.258	0.450
11-Jul	0.177	0.315	0.411	0.119	0.323	0.456	0.507	0.431	0.267	0.477
12-Jul	0.197	0.344	0.416	0.126	0.337	0.481	0.567	0.488	0.281	0.488
13-Jul	0.217	0.395	0.427	0.148	0.430	0.508	0.600	0.500	0.294	0.490
14-Jul	0.247	0.465	0.445	0.208	0.501	0.520	0.614	0.514	0.303	0.492
15-Jul	0.293	0.514	0.484	0.267	0.513	0.587	0.659	0.532	0.317	0.508
16-Jul	0.358	0.547	0.543	0.382	0.528	0.600	0.676	0.566	0.350	0.523
17-Jul	0.404	0.663	0.590	0.418	0.544	0.608	0.691	0.615	0.498	0.546
18-Jul	0.491	0.759	0.636	0.432	0.562	0.619	0.703	0.629	0.602	0.615
19-Jul	0.577	0.775	0.693	0.436	0.575	0.699	0.723	0.648	0.623	0.649
20-Jul	0.642	0.785	0.739	0.439	0.586	0.731	0.770	0.711	0.664	0.661
21-Jul	0.702	0.804	0.778	0.464	0.601	0.765	0.857	0.747	0.676	0.679
22-Jul	0.744	0.822	0.810	0.551	0.611	0.809	0.921	0.768	0.687	0.710
23-Jul	0.759	0.833	0.832	0.609	0.618	0.851	0.929	0.806	0.706	0.751
24-Jul	0.769	0.842	0.864	0.649	0.627	0.873	0.935	0.816	0.723	0.781
25-Jul	0.784	0.849	0.888	0.683	0.717	0.888	0.939	0.824	0.754	0.813
26-Jul	0.800	0.854	0.910	0.733	0.795	0.897	0.943	0.840	0.776	0.849
27-Jul	0.818	0.858	0.918	0.791	0.806	0.906	0.948	0.850	0.790	0.881
28-Jul	0.836	0.862	0.926	0.826	0.812	0.916	0.953	0.860	0.808	0.914
29-Jul	0.847	0.867	0.933	0.842	0.829	0.925	0.958	0.869	0.836	0.935
30-Jul	0.857	0.874	0.939	0.853	0.888	0.939	0.961	0.877	0.856	0.947
31-Jul	0.866	0.889	0.943	0.865	0.917	0.962	0.965	0.885	0.872	0.956

- Continued-

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	Cumulative Proportion <sup>b</sup>										
Date	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	
01-Aug	0.876	1.000	1.000	0.875	1.000	0.975	0.969	0.892	0.885	0.960	
02-Aug	0.886			0.881		0.982	0.973	0.898	0.901	0.966	
03-Aug	0.895			0.890		0.986	0.977	0.905	0.916	0.973	
04-Aug	1.000			0.898		0.990	0.983	0.916	0.924	0.978	
05-Aug				0.904		0.994	0.990	0.927	0.933	0.981	
06-Aug				0.909		0.997	0.993	0.943	0.941	0.987	
07-Aug				0.917		1.000	0.997	0.958	0.946	0.994	
08-Aug				0.927			1.000	0.963	0.953	1.000	
09-Aug				0.938				0.969	0.963		
10-Aug				0.945				0.976	0.972		
11-Aug				0.949				0.982	0.977		
12-Aug				1.000				0.986	0.984		
13-Aug								0.990	0.989		
14-Aug								0.996	0.995		
15-Aug								1.000	1.000		
Midpoint	7/01	7/19	7/15	7/16	7/22	7/14	7/13	7/11	7/14	7/18	7/15
No. days <sup>c</sup> for 80%	29	32	33	28	28	32	41	26	33	29	33

<sup>a</sup> Number of days for 80% for years not included in table: 1979-32; 1980-34; and 1981-29.

<sup>b</sup> Proportion accrued on first day (1983-1988) and last day (1981-1986) represents that portion of the escapement estimated before and after enumeration activities.

<sup>c</sup> Inclusive dates: 10% - 90%.



Table 17. Daily adjusted fish wheel catch by species for the Kasilof River, 26 June through 8 August, 1991.

Date	Hours Open	Sockeye		Pink		Chinook	
		Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>
26-Jun	1.55	62	62	0	0	0	0
27-Jun	20.20	160	222	0	0	0	0
28-Jun	8.85	285	507	0	0	0	0
29-Jun	17.80	487	994	0	0	0	0
30-Jun	0.50		994		0		0
01-Jul	6.50	159	1,153	0	0	0	0
02-Jul			1,153	0	0	0	0
03-Jul	11.95	127	1,280	0	0	0	0
04-Jul			1,280		0		0
05-Jul			1,280		0		0
06-Jul			1,280		0		0
07-Jul			1,280		0		0
08-Jul	24.00	125	1,405	12	12	0	0
09-Jul	22.80	117	1,522	7	19	0	0
10-Jul	22.40	203	1,725	6	25	0	0
11-Jul	22.60		1,725		25	0	0
12-Jul			1,725		25	0	0
13-Jul			1,725		25	0	0
14-Jul			1,725		25	0	0
15-Jul	26.40	23	1,748	5	30	0	0
16-Jul	20.00	125	1,873	0	30	0	0
17-Jul	25.50	36	1,909	4	34	0	0
18-Jul	25.45	378	2,287	9	43	2	2
19-Jul			2,287		43		2
20-Jul			2,287		43		2
21-Jul			2,287		43		2
22-Jul			2,287		43		2
23-Jul	22.00	514	2,801	10	53	1	3
24-Jul	3.25	67	2,868	7	60	0	3
25-Jul	10.00	14	2,882	7	67	0	3
26-Jul	9.75	84	2,966	0	67	0	3
27-Jul			2,966		67		3
28-Jul			2,966		67		3
29-Jul	16.80	49	3,015	3	70	0	3
30-Jul	24.00	29	3,044	3	73	4	7
31-Jul	23.50	15	3,059	0	73	0	7
01-Aug	26.75	15	3,074	2	75	0	7
02-Aug	23.20	12	3,086	0	75	2	9
03-Aug	24.10	8	3,094	0	75	0	9
04-Aug	25.40	6	3,100	1	76	1	10
05-Aug	17.90	4	3,104	0	76	0	10
06-Aug	26.40	3	3,107	0	76	0	10
07-Aug	24.90	9	3,116	0	76	0	10
08-Aug	23.20	8	3,124	0	76	0	10

<sup>a</sup> Fish wheel catch adjusted for 24 h: (daily catch \* 24 h)/hours open.

<sup>b</sup> Actual total catch by species: 1,889 sockeye salmon; 65 pink salmon; 1 coho salmon; 14 chinook salmon; 1 chum salmon.

Table 18. Age composition of sockeye salmon collected in the Kasilof River, 1969-1991.

Sample Period	Percentage Composition by Age Class <sup>a</sup>								Sample Size
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	Other	
6/15-6/30	0.0	11.7	68.7	0.2	0.0	14.1	5.1	0.2	531
7/01-7/10	0.0	21.7	40.4	0.2	0.0	29.4	8.1	0.2	497
7/11-7/20	0.0	38.3	24.8	0.0	0.0	30.6	6.0	0.4	553
7/21-8/08	0.0	47.4	9.5	0.0	0.2	38.1	4.8	0.0	525
Seasonal Summary									
1969	0.0	14.0	39.0	1.0	0.0	30.0	16.0	0.0	399
1970	tr	32.0	37.0	2.0	0.0	16.0	11.0	2.0	297
1971	0.0	6.0	69.0	0.0	0.0	8.0	16.0	1.0	153
1972	tr	42.0	36.0	1.0	tr	3.0	18.0	0.0	668
1973	0.0	20.0	57.0	0.0	0.0	19.0	4.0	0.0	374
1974	0.0	35.0	59.0	0.0	tr	4.0	2.0	0.0	254
1975	1.0	29.0	7.0	0.0	0.0	58.0	4.0	1.0	931
1976	tr	32.0	20.0	0.0	tr	35.0	12.0	1.0	755
1977	tr	30.0	30.0	0.0	1.0	28.0	11.0	0.0	1,209
1978	0.0	42.0	35.0	0.0	0.0	14.0	9.0	0.0	967
1979	0.0	52.2	37.2	0.0	tr	8.4	1.7	0.5	590
1980	0.0	58.7	27.8	0.0	0.0	8.0	4.5	1.0	899
1981	0.0	30.2	62.2	0.0	0.0	6.0	1.6	0.0	1,479
1982	1.0	34.0	49.5	0.0	0.1	10.7	4.7	0.0	1,518
1983	0.0	48.4	34.3	0.0	0.0	12.8	4.5	0.0	1,997
1984	0.0	50.5	24.8	tr	0.2	17.9	6.6	0.0	2,269
1985	0.2	57.3	21.8	0.1	0.1	17.8	2.6	0.1	3,063
1986	0.0	40.9	42.0	0.3	0.1	11.9	4.6	0.2	1,660
1987		43.4	27.4	0.0	0.1	22.4	6.4	0.3	1,248
1988	0.9	37.5	32.9	0.1	0.1	18.6	10.6	0.2	2,282
1989	0.2	44.0	46.3	0.2	0.0	5.2	4.2	0.0	1,216
1990	0.4	32.9	20.7	0.3	0.0	33.2	12.4	0.3	762
1991	0.0	31.5	33.4	0.1	0.1	29.0	5.8	0.1	2,106

<sup>a</sup> Percentages weighted by total numbers in the escapement: 1979-1991.

Table 19. Length composition of the major age classes of sockeye salmon collected in the Kasilof River, 1980-1991<sup>a</sup>.

Year	Age Class	Male			Female			Total			Ratio Male/Female
		Ave Length (mm)	Stdnd Error	Sample Size	Ave Length (mm)	Stdnd Error	Sample Size	Ave Length (mm)	Stdnd Error	Sample Size	
1980	1.2	474	2	189	464	1	376	467		565	0.5:1
1981		503	2	241	492	3	146	499		387	1.7:1
1982		481	2	285	466	2	235	474	2	475	1.2:1
1983		493	2	113	491	3	78	492	2	191	1.4:1
1984		480	1	544	478	1	428	479	1	972	2.6:1
1985		474	1	723	472	1	897	473	1	1620	0.8:1
1986		482	2	266	482	1	368	482	1	634	0.7:1
1987		472	2	282	470	2	257	471	1	539	1.1:1
1988		480	1	353	477	1	480	478	1	833	0.7:1
1989		481	2	245	480	2	290	480	1	535	0.8:1
1990		462	0	139	458	0	91	460	0	230	1.5:1
1991		467	2	326	461	2	305	464	1	631	1.1:1
1980	1.3	531	7	35	516	2	115	520		150	0.3:1
1981		566	1	422	558	1	369	562		791	1.1:1
1982		549	1	377	542	1	428	545	1	805	0.9:1
1983		558	2	170	547	2	187	552	1	357	0.9:1
1984		539	1	304	533	1	383	535	1	687	0.8:1
1985		531	2	341	527	1	433	529	1	774	0.8:1
1986		550	2	342	543	1	405	546	1	747	0.8:1
1987		553	2	191	552	2	154	552	2	345	1.2:1
1988		550	1	311	543	1	382	546	1	693	0.8:1
1989		550	2	266	542	2	296	546	1	562	0.9:1
1990		518	0	81	523	0	106	521	0	187	0.8:1
1991		531	1	418	518	1	335	525	1	753	1.3:1
1982	2.2	479	3	65	472	3	81	475	3	146	0.8:1
1984		484	2	202	482	1	223	483	1	425	0.9:1
1985		482	2	248	476	1	319	479	1	567	0.8:1
1986		492	4	78	489	2	115	490	2	193	0.7:1
1987		478	2	137	475	2	141	476	2	278	1.0:1
1988		486	2	173	479	1	220	482	1	393	0.8:1
1990		453	0	104	457	0	111	455	0	215	0.9:1
1991		471	2	289	480	11	301	475	5	590	1.0:1
1982	2.3	548	4	41	543	4	40	546	4	86	1.0:1
1984		533	3	102	526	3	80	530	2	182	1.3:1
1988		544	2	104	543	2	115	543	2	219	0.9:1
1990		514	0	63	529	0	61	522	0	124	1.0:1
1991		516	4	61	514	3	64	515	2	125	1.0:1

<sup>a</sup> Length measured from mid-eye to fork-of-tail.

Table 20. Estimated salmon escapement into the Crescent River, north and south banks combined, 26 June through 8 August, 1991<sup>a</sup>.

Date	Sockeye		Pink		Chum		Coho	
	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum
26-Jun	82	82	0	0	0	0	0	0
27-Jun	92	174	0	0	0	0	0	0
28-Jun	101	275	1	1	0	0	0	0
29-Jun	171	446	1	2	0	0	0	0
30-Jun	147	593	1	3	0	0	0	0
01-Jul	178	771	1	4	0	0	0	0
02-Jul	607	1,378	3	7	0	0	0	0
03-Jul	79	1,457	0	7	0	0	0	0
04-Jul	345	1,802	2	9	0	0	0	0
05-Jul	935	2,737	6	15	0	0	0	0
06-Jul	52	2,789	0	15	0	0	0	0
07-Jul	79	2,868	0	15	0	0	0	0
08-Jul	643	3,511	4	19	0	0	0	0
09-Jul	494	4,005	3	22	0	0	0	0
10-Jul	113	4,118	0	22	0	0	0	0
11-Jul	351	4,469	2	24	0	0	0	0
12-Jul	1,355	5,824	8	32	0	0	0	0
13-Jul	550	6,374	3	35	0	0	0	0
14-Jul	2,023	8,397	12	47	0	0	0	0
15-Jul	2,509	10,906	15	62	0	0	0	0
16-Jul	2,112	13,018	13	75	0	0	0	0
17-Jul	2,816	15,834	18	93	0	0	0	0
18-Jul	3,119	18,953	19	112	0	0	0	0
19-Jul	1,618	20,571	22	134	75	75	0	0
20-Jul	1,580	22,151	20	154	74	149	0	0
21-Jul	1,192	23,343	17	171	55	204	0	0
22-Jul	2,588	25,931	34	205	120	324	0	0
23-Jul	2,988	28,919	39	244	139	463	0	0
24-Jul	1,767	30,686	23	267	82	545	0	0
25-Jul	1,304	31,990	18	285	60	605	0	0
26-Jul	1,572	33,562	0	285	248	853	12	12
27-Jul	2,138	35,700	0	285	337	1,190	16	28
28-Jul	1,571	37,271	0	285	248	1,438	12	40
29-Jul	1,330	38,601	0	285	209	1,647	10	50
30-Jul	846	39,447	0	285	134	1,781	6	56
31-Jul	1,403	40,850	0	285	221	2,002	11	67
01-Aug	2,214	43,064	0	285	350	2,352	16	83
02-Aug	533	43,597	13	298	1,314	3,666	0	83
03-Aug	248	43,845	7	305	611	4,277	0	83
04-Aug	164	44,009	4	309	404	4,681	0	83
05-Aug	215	44,224	5	314	528	5,209	0	83
06-Aug	181	44,405	4	318	445	5,654	0	83
07-Aug	173	44,578	4	322	426	6,080	0	83

<sup>a</sup> Species composition of daily sonar counts based on trap catches.

Table 21. Daily fish trap catch by species for the Crescent River, 2 July through 7 August, 1991.

Date	Sockeye		Pink		Chum		Coho	
	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum
02-Jul	3	3	0	0	0	0	0	0
03-Jul	1	4	0	0	0	0	0	0
04-Jul	5	9	0	0	0	0	0	0
05-Jul	17	26	0	0	0	0	0	0
06-Jul	0	26	0	0	0	0	0	0
07-Jul	0	26	0	0	0	0	0	0
08-Jul	3	29	0	0	0	0	0	0
09-Jul	5	34	0	0	0	0	0	0
10-Jul	0	34	0	0	0	0	0	0
11-Jul	3	37	0	0	0	0	0	0
12-Jul	6	43	0	0	0	0	0	0
13-Jul	34	77	0	0	0	0	0	0
14-Jul	19	96	0	1	0	0	0	0
15-Jul	18	114	0	1	0	0	0	0
16-Jul	20	134	0	1	0	0	0	0
17-Jul	11	145	0	1	0	0	0	0
18-Jul	20	165	0	1	0	0	0	0
19-Jul	17	182	0	1	0	0	0	0
20-Jul	4	186	0	1	0	0	0	0
21-Jul	47	233	1	2	0	0	0	0
22-Jul	11	244	0	2	3	3	0	0
23-Jul	34	278	0	2	2	5	0	0
24-Jul	18	296	1	3	2	7	0	0
25-Jul	20	316	0	3	0	7	0	0
26-Jul	12	328	0	3	1	8	0	0
27-Jul	26	354	0	3	3	11	0	0
28-Jul	13	367	0	3	4	15	0	0
29-Jul	15	382	0	3	0	15	0	0
30-Jul	3	385	0	3	3	18	0	0
31-Jul	21	406	0	3	1	19	1	1
01-Aug	43	449	0	3	9	28	0	1
02-Aug	19	468	0	3	11	39	0	1
03-Aug	4	472	0	3	12	51	0	1
04-Aug	4	476	0	3	15	66	0	1
05-Aug	3	479	1	4	27	93	0	1
06-Aug	6	485	0	4	19	112	0	1
07-Aug	5	490	0	4	17	129	0	1

Table 22. Cumulative proportion by date of sockeye salmon counts recorded in the Crescent River, 1982-1991.<sup>a</sup>

Date	Cumulative Proportion <sup>b</sup>									
	1982	1983	1984 <sup>c</sup>	1985	1986 <sup>d</sup>	1987	1988	1989	1990	1991
15-Jun			0.000	0.000						
16-Jun			0.001	0.000						
17-Jun			0.002	0.000						
18-Jun			0.003	0.000						
19-Jun			0.003	0.000						
20-Jun			0.005	0.001						
21-Jun			0.008	0.001						
22-Jun			0.012	0.001						
23-Jun			0.017	0.001						
24-Jun			0.020	0.001						
25-Jun			0.024	0.001	0.000					
26-Jun			0.027	0.001	0.000				0.003	0.002
27-Jun			0.036	0.002	0.000				0.007	0.004
28-Jun			0.041	0.002	0.001				0.013	0.005
29-Jun			0.049	0.005	0.005				0.021	0.010
30-Jun			0.069	0.007	0.008				0.025	0.013
01-Jul	0.000	0.000	0.081	0.008	0.017	0.012	0.008	0.008	0.034	0.017
02-Jul	0.000	0.000	0.100	0.012	0.031	0.016	0.038	0.020	0.055	0.031
03-Jul	0.001	0.001	0.118	0.016	0.054	0.020	0.149	0.043	0.065	0.033
04-Jul	0.001	0.002	0.140	0.057	0.077	0.023	0.223	0.096	0.077	0.040
05-Jul	0.002	0.019	0.156	0.138	0.084	0.027	0.269	0.129	0.098	0.061
06-Jul	0.002	0.041	0.170	0.188	0.094	0.058	0.338	0.181	0.128	0.063
07-Jul	0.005	0.068	0.184	0.196	0.110	0.084	0.404	0.231	0.141	0.064
08-Jul	0.021	0.098	0.225	0.226	0.126	0.112	0.488	0.293	0.155	0.079
09-Jul	0.057	0.118	0.268	0.251	0.134	0.160	0.554	0.334	0.184	0.090
10-Jul	0.098	0.137	0.322	0.274	0.144	0.193	0.581	0.369	0.207	0.092
11-Jul	0.127	0.167	0.360	0.293	0.154	0.243	0.598	0.412	0.264	0.100
12-Jul	0.157	0.207	0.387	0.319	0.165	0.269	0.625	0.463	0.286	0.131
13-Jul	0.190	0.266	0.409	0.364	0.184	0.305	0.655	0.502	0.299	0.143
14-Jul	0.217	0.338	0.425	0.388	0.197	0.333	0.688	0.502	0.321	0.188
15-Jul	0.245	0.392	0.454	0.415	0.204	0.370	0.692	0.518	0.345	0.245
16-Jul	0.258	0.431	0.499	0.445	0.213	0.386	0.697	0.611	0.393	0.292
17-Jul	0.286	0.457	0.548	0.480		0.406	0.717	0.674	0.472	0.355
18-Jul	0.328	0.499	0.599	0.506		0.448	0.748	0.691	0.540	0.425
19-Jul	0.377	0.559	0.639	0.525		0.513	0.771	0.710	0.574	0.461
20-Jul	0.460	0.617	0.684	0.546		0.548	0.781	0.750	0.610	0.497
21-Jul	0.533	0.667	0.721	0.573		0.593	0.808	0.776	0.653	0.524
22-Jul	0.586	0.702	0.743	0.596		0.671	0.828	0.804	0.705	0.582
23-Jul	0.636	0.732	0.783	0.632		0.773	0.853	0.829	0.742	0.649
24-Jul	0.685	0.764	0.802	0.665		0.819	0.885	0.855	0.762	0.688
25-Jul	0.713	0.787	0.813	0.698		0.856	0.917	0.884	0.801	0.718
26-Jul	0.751	0.813	0.824	0.729		0.877	0.941	0.907	0.839	0.753
27-Jul	0.784	0.839	0.838	0.756		0.893	0.959	0.930	0.864	0.801
28-Jul	0.801	0.858	0.852	0.775		0.905	0.965	0.958	0.880	0.836
29-Jul	0.816	0.881	0.870	0.794		0.915	0.976	0.968	0.896	0.866
30-Jul	0.826	0.915	0.882	0.821		0.920	0.989	0.978	0.933	0.885
31-Jul	0.833	0.945	0.893	1.000		0.938	1.000	0.994	0.956	0.916
01-Aug	1.000	1.000	1.000			0.960		1.000	0.973	0.966
02-Aug						0.975			0.986	0.978
03-Aug						0.985			0.993	0.984
04-Aug						0.994			1.000	0.987
05-Aug						0.996				0.992
06-Aug						1.000				0.996
07-Aug										1.000

- Continued -

Table 22. (p. 2 of 2)

Date	Cumulative Proportion <sup>b</sup>									
	1982	1983	1984 <sup>c</sup>	1985	1986 <sup>d</sup>	1987	1988	1989	1990	1991
Midpoint	7/21	7/19	7/17	7/18		7/19	7/09	7/15	7/18	7/21
No. days <sup>e</sup> for 80%	21+	22+	31+	26+		21	23	22	25	21

<sup>a</sup> Number of days for 80% for years not included in table: 1979-23; 1980-23; and 1981-29.

<sup>b</sup> Proportion accrued on last day (1981-1985) represents that portion of the escapement estimated after enumeration activities.

<sup>c</sup> The enumeration site was moved from the outlet of Crescent Lake to approximately 2 miles above the terminus of the river at Cook Inlet in 1984.

<sup>d</sup> Enumeration activities terminated on 16 July 1986. Estimated proportions from King and Tarbox (1988).

<sup>e</sup> Inclusive dates: 10% - 90%.

Table 23. Age composition of sockeye salmon collected in the Crescent River, 1979-1991.

Sample Period	Percentage Composition by Age Class <sup>a</sup>								Sample Size
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	Other	
1979	tr	27.8	70.1	0.0	0.0	tr	tr	tr	643
1980	0.0	6.5	86.9	0.0	0.0	2.9	1.6	2.1	511
1981	0.0	8.2	32.1	0.0	0.0	9.6	49.9	tr	1,117
1982	0.0	12.9	79.2	0.1	0.0	0.8	7.0	0.0	711
1983	0.0	10.9	42.2	0.2	0.7	27.4	18.6	0.0	731
1984	0.0	3.5	16.9	0.0	0.0	20.0	59.4	tr	780
1985	0.2	4.7	31.3	0.0	0.3	20.5	43.0	0.0	594
1986	0.0	6.5	15.8	0.0	0.0	13.0	64.0	0.7	139
1987	0.0	2.6	47.7	0.0	0.0	4.2	45.0	0.5	191
1988	0.0	10.4	44.9	0.5	0.1	17.8	26.1	0.1	741
1989	0.0	2.6	84.2	0.6	0.0	0.6	15.0	0.1	728
1990	0.0	3.7	48.5	0.4	0.1	3.5	43.2	0.5	591
1991	0.0	14.9	50.4	0.3	0.0	16.8	16.5	1.1	357

<sup>a</sup> Percentages weighted by total numbers in the escapement: 1979-1981, 1986-1991.



Table 24. Length composition of the major age classes of sockeye salmon collected in the Crescent River, 1980-1991<sup>a</sup>.

Year	Age Class	Male			Female			Total			Ratio Male/Female
		Ave Length (mm)	Stndrd Error	Sample Size	Ave Length (mm)	Stndrd Error	Sample Size	Ave Length (mm)	Stndrd Error	Sample Size	
1980	1.2	472	6	47	471	7	31	472		78	1.5:1
1981		522	9	59	491	9	33	511	9	92	1.8:1
1982		467	6	47	487	7	25	474	5	72	1.9:1
1991		517	6	36	490	8	17	509	5	53	2.1:1
1980	1.3	568	2	167	549	2	223	557		390	0.7:1
1981		576	3	121	555	3	172	564		293	0.7:1
1982		586	1	303	556	1	259	572	1	562	1.2:1
1983		570	2	111	542	2	169	553	1	280	0.7:1
1984		574	5	60	552	2	72	562	3	132	0.8:1
1985		565	4	75	551	2	111	557	2	186	0.7:1
1987		601	3	54	573	3	37	590	2	91	1.5:1
1988		581	2	195	550	2	138	567	1	333	1.4:1
1989		593	1	320	561	2	271	578	1	591	1.2:1
1990		592	3	184	571	0	120	584	0	304	1.5:1
1991		560	3	105	543	3	75	553	2	180	1.4:1
1981	2.2	487	6	40	519	5	57	506		97	0.7:1
1983		494	4	93	488	3	89	491	3	182	1.0:1
1984		499	4	81	507	4	75	503	3	156	1.1:1
1985		496	5	75	490	4	47	494	4	122	1.6:1
1988		487	5	72	496	4	60	491	3	132	1.2:1
1991		515	5	42	498	6	18	510	4	60	2.3:1
1980	2.3	584	2	158	554	2	237	566		395	0.7:1
1983		569	4	43	550	2	80	556	2	123	0.5:1
1984		581	2	261	553	2	202	569	1	463	1.3:1
1985		568	4	94	551	2	161	557	2	255	0.6:1
1986		573	5	44	556	3	45	564	3	89	1.0:1
1987		595	4	49	573	3	37	586	3	86	1.3:1
1988		585	3	110	556	2	83	572	2	193	1.3:1
1989		594	3	72	568	3	37	586	2	109	1.9:1
1990		601	0	165	571	0	72	592	0	237	2.3:1
1991		558	4	36	537	4	23	550	3	59	1.6:1

<sup>a</sup> Length measured from mid-eye to fork-of-tail.

Table 25. Estimated salmon escapement into the Yentna River, north and south banks combined, 7 July through 12 August, 1991<sup>a</sup>.

Date	Sockeye		Pink		Chum		Coho		Chinook	
	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum
07-Jul	49	49	151	151	1	1	10	10	10	10
08-Jul	62	111	192	343	2	3	13	23	13	23
09-Jul	31	142	92	435	0	3	7	30	5	28
10-Jul	34	176	108	543	1	4	6	36	8	36
11-Jul	33	209	104	647	1	5	6	42	8	44
12-Jul	35	244	101	748	0	5	7	49	6	50
13-Jul	54	298	171	919	1	6	11	60	12	62
14-Jul	50	348	143	1,062	0	6	10	70	8	70
15-Jul	80	428	137	1,199	6	12	12	82	6	76
16-Jul	95	523	151	1,350	6	18	14	96	6	82
17-Jul	58	581	101	1,451	4	22	8	104	5	87
18-Jul	407	988	596	2,047	25	47	56	160	19	106
19-Jul	2,057	3,045	2,727	4,744	136	183	284	444	37	143
20-Jul	7,905	10,950	2,189	6,963	244	427	1,153	1,597	7	150
21-Jul	10,183	21,133	2,113	9,076	191	618	1,691	3,288	13	163
22-Jul	11,985	33,118	2,280	11,356	270	888	1,554	4,842	0	163
23-Jul	8,301	41,419	2,189	13,545	291	1,179	1,140	5,982	0	163
24-Jul	5,201	46,620	2,734	16,279	130	1,309	746	6,728	0	163
25-Jul	2,790	49,410	3,104	19,383	328	1,637	667	7,395	14	177
26-Jul	5,946	55,356	3,845	23,228	507	2,144	2,248	9,643	0	177
27-Jul	7,682	63,038	4,017	27,245	750	2,894	4,109	13,752	0	177
28-Jul	6,754	69,792	5,968	33,213	922	3,816	2,734	16,486	0	177
29-Jul	4,149	73,941	4,397	37,610	461	4,277	1,499	17,985	0	177
30-Jul	5,015	78,956	5,164	42,774	551	4,828	2,116	20,101	0	177
31-Jul	3,690	82,646	5,458	48,232	520	5,348	1,071	21,172	0	177
01-Aug	2,761	85,407	2,806	51,038	550	5,898	681	21,853	0	177
02-Aug	2,940	88,347	1,966	53,004	940	6,838	776	22,629	27	204
03-Aug	4,802	93,149	3,625	56,629	787	7,625	1,304	23,933	0	204
04-Aug	4,554	97,703	3,952	60,581	1,487	9,112	4,659	28,892	0	204
05-Aug	4,268	101,971	5,013	65,594	3,349	12,461	8,172	36,764	0	204
06-Aug	1,269	103,240	3,093	68,687	1,294	13,755	2,636	39,400	0	204
07-Aug	1,898	105,138	2,989	71,676	2,522	16,277	5,135	44,535	0	204
08-Aug	1,737	106,875	1,544	73,220	1,417	17,694	3,993	48,528	0	204
09-Aug	1,227	108,102	1,042	74,262	1,476	19,170	3,303	51,831	0	204
10-Aug	902	109,004	727	74,989	924	20,094	3,509	55,340	0	204
11-Aug	471	109,475	313	75,302	789	20,883	1,293	56,633	0	204
12-Aug	157	109,632	75	75,377	772	21,655	642	57,275	0	204

<sup>a</sup> Species composition of daily sonar counts based on fish wheel catches.

Table 26. Salmon escapement observations in Susitna River tributaries, 1991.

			Number of Fish Observed or Estimated				
			Sockeye	Pink	Chum	Coho	Chinook
Chelatna Lake	mark/recap	b	7,689 <sup>d</sup>				
Deception Creek		a					747
Rabideux Creek		a				185	
Birch Creek		a				300	
Question Creek		a				495	
Answer Creek		a				51	
Goose Creek		a					968
Little Willow Creek		a					498
Montana Creek		a					1,605
Prairie Creek		a					6,770
Sheep Creek		a					154 <sup>c</sup>
Willow Creek		a					2,006
Alexander Creek		a					2,727
Deshka River		a					8,122 <sup>c</sup>
Lake Creek		a					3,011
Peters Creek		a					2,458

<sup>a</sup> Sport Fish Division records, Alaska Department of Fish and Game, Anchorage.

<sup>b</sup> Cook Inlet Aquaculture Association records, Soldotna.

<sup>c</sup> Counts estimated to be lower than actual number of spawners present due to poor survey conditions.

<sup>d</sup> Includes 1,284 fish taken for artificial propagation.

Table 27. Cumulative proportion by date of sockeye salmon counts recorded in the Yentna River, 1982-1991.<sup>a</sup>

Date	Cumulative Proportion <sup>b</sup>									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
27-Jun	0.000									
28-Jun	0.000									
29-Jun	0.000				0.001					
30-Jun	0.000	0.000			0.002					
01-Jul	0.001	0.001	0.001	0.000	0.002	0.000				
02-Jul	0.001	0.001	0.001	0.001	0.003	0.001				
03-Jul	0.001	0.002	0.002	0.001	0.003	0.001				
04-Jul	0.002	0.003	0.003	0.001	0.004	0.002				
05-Jul	0.002	0.003	0.004	0.001	0.005	0.002				
06-Jul	0.002	0.004	0.004	0.002	0.005	0.003				
07-Jul	0.002	0.004	0.005	0.003	0.006	0.003	0.004	0.003	0.002	0.000
08-Jul	0.002	0.004	0.005	0.003	0.006	0.004	0.008	0.006	0.005	0.001
09-Jul	0.002	0.005	0.006	0.004	0.007	0.004	0.012	0.009	0.008	0.001
10-Jul	0.002	0.005	0.007	0.005	0.008	0.005	0.016	0.012	0.010	0.002
11-Jul	0.003	0.006	0.009	0.006	0.009	0.005	0.019	0.014	0.013	0.002
12-Jul	0.003	0.008	0.011	0.007	0.010	0.005	0.022	0.015	0.014	0.002
13-Jul	0.003	0.011	0.012	0.008	0.011	0.006	0.025	0.016	0.016	0.003
14-Jul	0.003	0.034	0.015	0.009	0.011	0.007	0.029	0.019	0.017	0.003
15-Jul	0.004	0.059	0.017	0.010	0.014	0.008	0.034	0.023	0.019	0.004
16-Jul	0.005	0.096	0.023	0.010	0.022	0.010	0.039	0.026	0.020	0.005
17-Jul	0.016	0.131	0.142	0.011	0.027	0.014	0.043	0.051	0.022	0.005
18-Jul	0.043	0.179	0.232	0.012	0.036	0.020	0.046	0.103	0.025	0.009
19-Jul	0.155	0.351	0.345	0.013	0.041	0.027	0.091	0.161	0.105	0.028
20-Jul	0.329	0.567	0.458	0.014	0.042	0.034	0.197	0.202	0.217	0.100
21-Jul	0.527	0.693	0.554	0.014	0.043	0.047	0.270	0.234	0.284	0.193
22-Jul	0.627	0.722	0.626	0.016	0.052	0.059	0.304	0.280	0.327	0.302
23-Jul	0.665	0.758	0.681	0.019	0.162	0.107	0.375	0.359	0.383	0.378
24-Jul	0.711	0.786	0.755	0.145	0.193	0.218	0.484	0.453	0.452	0.425
25-Jul	0.734	0.824	0.785	0.359	0.253	0.331	0.630	0.532	0.505	0.451
26-Jul	0.780	0.867	0.808	0.507	0.371	0.442	0.771	0.646	0.573	0.505
27-Jul	0.811	0.894	0.836	0.636	0.491	0.528	0.821	0.749	0.667	0.575
28-Jul	0.831	0.905	0.855	0.782	0.606	0.587	0.858	0.799	0.734	0.637
29-Jul	0.847	0.913	0.866	0.903	0.752	0.625	0.886	0.854	0.769	0.674
30-Jul	0.859	0.921	0.874	0.942	0.831	0.655	0.916	0.864	0.796	0.720
31-Jul	0.890	0.925	0.885	0.960	0.861	0.686	0.937	0.868	0.825	0.754
01-Aug	0.933	0.929	0.893	0.970	0.882	0.709	0.947	0.873	0.859	0.779
02-Aug	0.948	0.937	0.901	0.978	0.908	0.750	0.960	0.879	0.907	0.806
03-Aug	0.955	0.941	0.909	0.983	0.917	0.789	0.969	0.889	0.947	0.850
04-Aug	0.962	0.945	0.920	0.987	0.924	0.825	0.975	0.907	0.962	0.891
05-Aug	0.965	0.949	0.926	0.990	0.935	0.857	0.981	0.923	0.971	0.930
06-Aug	0.967	0.953	0.934	0.994	0.940	0.875	0.984	0.936	0.978	0.942
07-Aug	0.970	0.955	0.939	0.997	1.000	0.889	0.989	0.944	0.985	0.959
08-Aug	0.972	0.958	0.944	1.000		0.900	0.992	0.949	0.990	0.975
09-Aug	0.975	0.959	0.949			0.932	0.994	0.954	0.994	0.986
10-Aug	0.977	0.959	0.954			0.962	0.996	0.958	0.995	0.994
11-Aug	0.979	0.962	0.958			0.986	1.000	0.962	0.998	0.999
12-Aug	0.981	0.968	0.962			0.996		0.966	1.000	1.000
13-Aug	0.982	0.974	0.965			1.000		0.975		
14-Aug	0.984	0.977	0.968					0.985		
15-Aug	0.985	0.979	0.970					0.992		
16-Aug	0.986	0.982	0.973					0.995		
17-Aug	0.987	0.985	0.975					0.997		
18-Aug	0.988	0.987	0.977					0.998		
19-Aug	0.989	0.988	0.979					0.999		

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Date	Cumulative Proportion <sup>b</sup>									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
20-Aug	0.990	0.990	0.980					1.000		
21-Aug	0.990	0.991	0.981							
22-Aug	0.990	0.992	0.984							
23-Aug	0.991	0.993	0.987							
24-Aug	0.992	0.994	0.989							
25-Aug	0.993	0.994	0.992							
26-Aug	0.994	0.995	0.994							
27-Aug	0.994	0.996	0.996							
28-Aug	0.995	0.997	0.996							
29-Aug	0.996	0.998	0.998							
30-Aug	0.997	0.998	0.999							
31-Aug	0.997	0.999	0.999							
01-Sep	0.998	0.999	1.000							
02-Sep	0.999	0.999	1.000							
03-Sep	0.999	0.999	1.000							
04-Sep	1.000	1.000	1.000							
Midpoint	7/21	7/20	7/21	7/26	7/28	7/27	7/25	7/25	7/25	7/26
No. days <sup>c</sup> for 80%	14	12	17	6	11+	17	11	18	15	17

<sup>a</sup> Number of days for 80% for 1981-14.

<sup>b</sup> Proportion accrued on last day (1986) represents that portion of the escapement estimated after termination of enumeration activities.

<sup>c</sup> Inclusive dates: 10% - 90%.

Table 28. Daily adjusted fish wheel catch by species for the north bank of the Yentna River, 7 July through 12 August, 1991.

Date	Hours Open <sup>a</sup>	Sockeye		Pink		Chum		Coho		Chinook	
		Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>
07-Jul	28.00	3	3	4	4	0	0	0	0	2	2
08-Jul	23.25	1	4	6	10	0	0	1	1	3	5
09-Jul	23.58	0	4	5	15	0	0	0	1	0	5
10-Jul	21.70	2	6	9	24	0	0	0	1	0	5
11-Jul	23.05	2	8	9	33	0	0	0	1	0	5
12-Jul	24.38	1	9	3	36	0	0	0	1	0	5
13-Jul	16.42	2	11	4	40	0	0	0	1	2	7
14-Jul	23.16	3	14	7	47	0	0	1	2	0	7
15-Jul	24.42	4	18	16	63	1	1	0	2	0	7
16-Jul	23.66	0	18	24	87	0	1	4	6	4	11
17-Jul	24.83	2	20	23	110	0	1	0	6	1	12
18-Jul	24.25	8	28	4	114	2	3	1	7	0	12
19-Jul	10.38	16	44	88	202	0	3	2	9	0	12
20-Jul	11.67	27	71	35	237	8	11	14	23	2	14
21-Jul	13.83	95	166	85	322	12	23	57	80	2	16
22-Jul	6.48	115	281	144	466	22	45	37	117	0	16
23-Jul	8.06	54	335	101	567	15	60	9	126	0	16
24-Jul	15.60	95	430	122	689	14	74	40	166	0	16
25-Jul	8.00	78	508	168	857	27	101	9	175	0	16
26-Jul	10.73	83	591	154	1,011	45	146	60	235	0	16
27-Jul	12.13	50	641	141	1,152	46	192	48	283	0	16
28-Jul	12.66	63	704	248	1,400	72	264	49	332	0	16
29-Jul	11.58	46	750	155	1,555	31	295	27	359	0	16
30-Jul	13.63	55	805	220	1,775	73	368	72	431	0	16
31-Jul	12.60	23	828	86	1,861	31	399	21	452	0	16
01-Aug	12.90	56	884	86	1,947	35	434	21	473	0	16
02-Aug	11.28	94	978	172	2,119	121	555	45	518	2	18
03-Aug	9.88	139	1,117	350	2,469	153	708	119	637	0	18
04-Aug	8.36	103	1,220	296	2,765	167	875	299	936	0	18
05-Aug	9.38	174	1,394	392	3,157	310	1,185	297	1,233	0	18
06-Aug	8.46	85	1,479	633	3,790	218	1,403	184	1,417	0	18
07-Aug	7.00	82	1,561	562	4,352	322	1,725	261	1,678	0	18
08-Aug	5.80	112	1,673	270	4,622	207	1,932	236	1,914	0	18
09-Aug	6.23	89	1,762	239	4,861	208	2,140	277	2,191	0	18
10-Aug	7.32	43	1,805	134	4,995	193	2,333	233	2,424	0	18
11-Aug	7.92	30	1,835	115	5,110	188	2,521	103	2,527	0	18
12-Aug	7.53	26	1,861	29	5,139	118	2,639	77	2,604	0	18

<sup>a</sup> Fish wheel catch adjusted for 24 hours: (daily catch \* 24 hours)/hours open.

<sup>b</sup> Actual catch: 768 sockeye salmon; 2,071 pink salmon; 946 chum salmon; 932 coho salmon; 15 chinook salmon.

Table 29. Daily adjusted fish wheel catch by species for the south bank of the Yentna River, 7 July through 12 August, 1991.

Date	Hours Open <sup>a</sup>	Sockeye		Pink		Chum		Coho		Chinook	
		Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>
07-Jul	30.30	6	6	2	2	0	0	0	0	0	0
08-Jul	23.33	3	9	11	13	0	0	0	0	1	1
09-Jul	23.66	6	15	18	31	0	0	2	2	1	2
10-Jul	21.50	6	21	21	52	0	0	0	2	0	2
11-Jul	22.83	7	28	29	81	0	0	1	3	0	2
12-Jul	21.23	2	30	9	90	0	0	2	5	1	3
13-Jul	19.75	6	36	7	97	0	0	1	6	2	5
14-Jul	22.41	5	41	6	99	0	0	1	7	0	5
15-Jul	23.50	12	53	14	113	0	0	4	11	1	6
16-Jul	23.75	5	58	26	139	0	0	3	14	0	6
17-Jul	24.60	6	64	29	168	0	0	2	16	1	7
18-Jul	24.40	12	76	27	195	0	0	1	17	1	8
19-Jul	11.33	148	224	33	228	11	11	13	30	0	8
20-Jul	5.95	432	656	97	325	12	23	61	91	0	8
21-Jul	8.25	1,297	1,953	209	534	15	38	177	268	0	8
22-Jul	5.03	2,734	4,687	196	730	10	48	296	564	0	8
23-Jul	5.10	1,680	6,367	179	909	19	67	226	790	0	8
24-Jul	8.34	1,062	7,429	481	1,390	14	81	124	914	0	8
25-Jul	8.20	568	7,997	597	1,987	59	140	140	1,054	3	11
26-Jul	7.00	679	8,676	405	2,392	45	185	247	1,301	0	11
27-Jul	6.01	1,274	9,950	543	2,935	80	265	659	1,960	0	11
28-Jul	5.59	1,455	11,405	1,138	4,073	150	415	571	2,531	0	11
29-Jul	5.66	1,353	12,758	1,336	5,409	127	542	479	3,010	0	11
30-Jul	6.40	1,436	14,194	1,395	6,804	124	666	581	3,591	0	11
31-Jul	7.40	610	14,804	874	7,678	74	740	172	3,763	0	11
01-Aug	9.50	227	15,031	217	7,895	35	775	53	3,816	0	11
02-Aug	9.29	390	15,421	207	8,102	80	855	93	3,909	3	14
03-Aug	4.73	1,395	16,816	812	8,914	101	956	299	4,209	0	14
04-Aug	3.40	1,638	18,454	854	9,768	169	1,125	1,144	5,352	0	14
05-Aug	4.68	826	19,280	636	10,404	338	1,463	1,646	6,998	0	14
06-Aug	7.40	421	19,701	759	11,163	347	1,810	872	7,870	0	14
07-Aug	6.03	386	20,087	374	11,537	398	2,208	1,023	8,893	0	14
08-Aug	6.55	429	20,516	271	11,808	275	2,483	1,000	9,893	0	14
09-Aug	7.00	312	20,828	206	12,014	339	2,822	826	10,719	0	14
10-Aug	4.12	256	21,084	163	12,177	198	3,020	967	11,686	0	14
11-Aug	4.45	167	21,251	86	12,263	243	3,263	453	12,139	0	14
12-Aug	6.32	49	21,300	15	12,278	243	3,506	213	12,352	0	14

<sup>a</sup> Fish wheel catch adjusted for 24 hours: (daily catch \* 24 hours)/hours open.

<sup>b</sup> Actual catch: 5,368 sockeye salmon; 3,368 pink salmon; 877 chum salmon; 2,936 coho salmon; 14 chinook salmon.

Table 30. Age composition of sockeye salmon collected in the Yentna River, 1986-1991.

Sample Period	Percentage Composition by Age Class <sup>a</sup>										Sample Size
	0.2	0.3	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	
7/07-7/22	1.9	13.9	0.0	20.0	46.1	0.0	0.2	5.1	12.4	0.0	410
7/23-7/30	2.2	11.5	0.0	25.0	44.9	0.2	0.0	6.5	9.6	0.2	677
7/31-8/12	2.1	5.7	0.5	31.3	38.9	0.0	0.2	10.0	11.4	0.0	422
Seasonal Summary											
1986	0.0	2.1	1.9	22.7	56.5	0.2	0.6	5.9	10.0	0.1	492
1987	1.3	2.4	0.9	23.3	50.6	1.0	0.0	8.6	11.7	0.0	1,089
1988	2.7	2.4	0.4	33.5	41.9	0.2	1.7	6.5	10.4	0.1	1,727
1989	0.2	0.2	1.3	27.2	63.5	0.4	0.2	3.0	4.0	0.0	1,362
1990	0.8	2.4	0.3	29.9	47.6	0.7	0.1	9.8	8.2	0.1	1,710
1991	2.0	10.1	0.1	25.2	44.1	0.1	0.1	7.0	11.1	0.1	1,509

<sup>a</sup> Percentages weighted by total numbers in the escapement.



Table 31. Length composition of the major age classes of sockeye salmon collected in the Yentna River, 1986-1991.<sup>a</sup>

Year	Age Class	Male			Female			Total			Ratio Male/Female
		Ave Length (mm)	Stndrd Error	Sample Size	Ave Length (mm)	Stndrd Error	Sample Size	Ave Length (mm)	Stndrd Error	Sample Size	
1991	0.3	572	5	59	550	2	100	558	2	159	0.6:1
1986	1.2	455	3	104	472	5	52	461	3	156	2.0:1
1987		484	3	158	477	2	156	480	2	314	1.0:1
1988		461	2	408	486	3	170	469	2	578	2.4:1
1989		463	4	246	485	4	122	471	3	368	2.0:1
1990		446	0	305	446	0	238	446	0	543	1.3:1
1991		460	3	253	484	2	130	468	2	383	2.0:1
1986	1.3	579	3	172	563	2	216	570	2	388	0.8:1
1987		591	2	246	565	2	222	580	1	468	1.1:1
1988		580	2	365	552	1	359	567	1	724	1.0:1
1989		575	3	390	553	1	474	563	1	864	0.8:1
1990		573	0	400	552	0	526	561	0	926	0.7:1
1991		562	2	301	542	1	356	551	1	657	0.9:1
1986	2.3	588	5	25	555	4	44	567	3	69	0.6:1
1987		583	4	62	566	3	52	577	3	114	1.2:1
1988		585	4	92	554	3	87	570	2	179	1.1:1
1990		574	0	73	542	0	96	555	0	169	0.8:1
1991		561	4	78	536	3	86	547	2	164	0.9:1

<sup>a</sup> Length measured from mid-eye to fork-of-tail.

Table 32. Cumulative proportion by date of pink salmon counts recorded in the Yentna River, 1982-1991.

Date	Cumulative Proportion									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
27-Jun	0.000									
28-Jun	0.000									
29-Jun	0.000				0.000	0.000				
30-Jun	0.000	0.000			0.000	0.000				
01-Jul	0.000	0.001	0.000	0.001	0.000	0.002				
02-Jul	0.000	0.001	0.000	0.002	0.000	0.004				
03-Jul	0.000	0.001	0.000	0.003	0.000	0.008				
04-Jul	0.000	0.002	0.000	0.003	0.000	0.011				
05-Jul	0.000	0.003	0.000	0.005	0.001	0.015				
06-Jul	0.000	0.003	0.000	0.007	0.001	0.018				
07-Jul	0.000	0.003	0.000	0.011	0.001	0.022	0.000	0.003	0.000	0.002
08-Jul	0.000	0.003	0.000	0.012	0.001	0.025	0.000	0.008	0.000	0.005
09-Jul	0.000	0.004	0.000	0.015	0.001	0.029	0.000	0.013	0.000	0.006
10-Jul	0.000	0.004	0.000	0.018	0.001	0.031	0.000	0.018	0.000	0.007
11-Jul	0.000	0.005	0.001	0.021	0.001	0.035	0.000	0.026	0.000	0.009
12-Jul	0.000	0.006	0.001	0.025	0.001	0.041	0.000	0.034	0.000	0.010
13-Jul	0.000	0.009	0.001	0.030	0.001	0.047	0.000	0.043	0.001	0.012
14-Jul	0.000	0.030	0.001	0.033	0.002	0.051	0.000	0.052	0.001	0.014
15-Jul	0.000	0.039	0.001	0.038	0.003	0.056	0.001	0.058	0.001	0.016
16-Jul	0.000	0.056	0.001	0.042	0.007	0.065	0.001	0.060	0.001	0.018
17-Jul	0.001	0.098	0.003	0.046	0.011	0.075	0.001	0.071	0.002	0.019
18-Jul	0.002	0.171	0.008	0.050	0.014	0.088	0.001	0.105	0.002	0.027
19-Jul	0.010	0.288	0.023	0.053	0.015	0.099	0.002	0.158	0.014	0.063
20-Jul	0.021	0.400	0.067	0.056	0.016	0.110	0.005	0.196	0.030	0.092
21-Jul	0.040	0.511	0.126	0.060	0.017	0.135	0.013	0.224	0.050	0.120
22-Jul	0.056	0.565	0.190	0.064	0.021	0.156	0.019	0.255	0.084	0.151
23-Jul	0.078	0.638	0.277	0.078	0.059	0.180	0.032	0.287	0.132	0.180
24-Jul	0.126	0.704	0.365	0.135	0.125	0.222	0.061	0.349	0.190	0.216
25-Jul	0.162	0.743	0.420	0.226	0.222	0.307	0.129	0.420	0.263	0.257
26-Jul	0.192	0.791	0.466	0.329	0.369	0.407	0.231	0.493	0.342	0.308
27-Jul	0.237	0.820	0.510	0.475	0.535	0.537	0.338	0.570	0.433	0.361
28-Jul	0.330	0.843	0.578	0.636	0.695	0.624	0.459	0.638	0.514	0.441
29-Jul	0.447	0.855	0.669	0.763	0.830	0.668	0.589	0.691	0.580	0.499
30-Jul	0.562	0.864	0.728	0.833	0.894	0.701	0.662	0.730	0.640	0.567
31-Jul	0.654	0.871	0.784	0.877	0.924	0.729	0.722	0.748	0.722	0.640
01-Aug	0.735	0.879	0.837	0.903	0.957	0.741	0.768	0.759	0.815	0.677
02-Aug	0.824	0.903	0.873	0.926	0.979	0.767	0.826	0.770	0.884	0.703
03-Aug	0.896	0.908	0.903	0.942	0.991	0.799	0.878	0.781	0.927	0.751
04-Aug	0.934	0.912	0.925	0.956	0.996	0.838	0.909	0.812	0.947	0.804
05-Aug	0.953	0.918	0.943	0.966	0.999	0.870	0.931	0.850	0.964	0.870
06-Aug	0.962	0.924	0.956	0.978	1.000	0.887	0.951	0.883	0.976	0.911
07-Aug	0.969	0.931	0.962	0.991		0.895	0.969	0.912	0.984	0.951
08-Aug	0.978	0.936	0.969	1.000		0.901	0.982	0.924	0.990	0.971
09-Aug	0.984	0.937	0.975			0.921	0.990	0.938	0.994	0.985
10-Aug	0.989	0.938	0.982			0.950	0.995	0.943	0.997	0.995
11-Aug	0.991	0.943	0.986			0.975	1.000	0.948	0.998	0.999
12-Aug	0.994	0.951	0.988			0.989		0.952	1.000	1.000
13-Aug	0.996	0.958	0.991			0.996		0.963		
14-Aug	0.997	0.966	0.992			1.000		0.974		
15-Aug	0.998	0.971	0.994					0.989		
16-Aug	0.998	0.978	0.994					0.994		
17-Aug	0.999	0.984	0.995					0.997		
18-Aug	0.999	0.988	0.996					0.998		
19-Aug	0.999	0.990	0.997					0.999		

- Continued -

Table 32. (p. 2 of 2)

Date	Cumulative Proportion									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
20-Aug	0.999	0.992	0.997					1.000		
21-Aug	0.999	0.993	0.997							
22-Aug	1.000	0.993	0.998							
23-Aug	1.000	0.994	0.998							
24-Aug	1.000	0.995	0.998							
25-Aug	1.000	0.996	0.999							
26-Aug	1.000	0.996	0.999							
27-Aug	1.000	0.997	0.999							
28-Aug	1.000	0.998	0.999							
29-Aug	1.000	0.998	0.999							
30-Aug	1.000	0.999	1.000							
31-Aug	1.000	0.999	1.000							
01-Sep	1.000	0.999	1.000							
02-Sep	1.000	0.999	1.000							
03-Sep	1.000	1.000	1.000							
04-Sep	1.000	1.000	1.000							
05-Sep	1.000	1.000	1.000							
Midpoint	7/30	7/21	7/27	7/28	7/27	7/27	7/29	7/27	7/28	7/30
No. days <sup>a</sup> for 80%	12	16	14	9	8+	20	11	21	12	17

<sup>a</sup> Inclusive dates: 10% - 90%.

Table 33. Daily adjusted fish wheel catch by species for the east bank of the Susitna River (Sunshine Station), 16 July through 4 August, 1991.

Date	Hours Open <sup>a</sup>	Sockeye		Pink		Chum		Coho		Chinook	
		Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>	Daily	Cum <sup>b</sup>
16-Jul	16.50	9	9	3	3	2	2	0	0	10	10
17-Jul	21.75	2	11	3	6	0	2	0	0	8	18
18-Jul	24.25	10	21	1	7	0	2	0	0	11	29
19-Jul	23.20	9	30	1	8	0	2	0	0	5	34
20-Jul	22.70	7	37	5	13	0	2	0	0	17	51
21-Jul	23.50	23	60	8	21	1	3	0	0	13	64
22-Jul	18.75	202	262	33	54	6	9	0	0	6	70
23-Jul	11.00	454	716	18	72	26	35	0	0	9	79
24-Jul	8.25	512	1,228	32	104	35	70	0	0	3	82
25-Jul	11.50	691	1,919	38	142	42	112	0	0	13	95
26-Jul	9.00	408	2,327	43	185	53	165	0	0	3	98
27-Jul	5.75	438	2,765	205	390	175	340	0	0	13	111
28-Jul	9.50	399	3,164	243	633	227	567	0	0	10	121
29-Jul	5.50	421	3,585	251	884	390	957	0	0	6	127
30-Jul	7.50	381	3,966	195	1,079	282	1,239	26	26	6	133
31-Jul	11.50	182	4,148	42	1,121	73	1,312	4	30	0	133
01-Aug	11.00	216	4,364	306	1,427	94	1,500	26	56	0	133
02-Aug	12.75	367	4,731	275	1,702	301	1,801	26	82	2	135
03-Aug	6.50	432	5,163	185	1,887	598	2,399	63	145	4	139
04-Aug	3.50	446	5,609	165	2,052	1,035	3,434	69	214	0	139

<sup>a</sup> Fish wheel catch adjusted for 24 hours: (daily catch \* 24 hours)/hours open.

<sup>b</sup> Actual catch: 2,176 sockeye salmon; 777 pink salmon; 980 chum salmon; 63 coho salmon; 89 chinook salmon.

Table 34. Age composition of sockeye salmon collected in the Susitna River (Sunshine Station), 1989-1991.

Sample Period	Percentage Composition by Age Class <sup>a</sup>								Sample Size
	1.1	0.3	1.2	2.1	1.3	2.2	2.3	Other	
7/15-7/23	0.0	0.2	12.0	0.0	72.6	2.1	13.2	0.0	437
7/24-7/26	0.0	1.8	21.8	0.0	72.9	2.2	1.3	0.0	389
7/27-7/30	0.2	0.4	25.6	0.0	67.1	4.6	2.0	0.0	371
7/31-8/03	0.0	0.2	27.0	0.2	59.4	7.5	5.7	0.0	367
Seasonal Summary									
1989	0.4	0.2	28.7	0.0	66.0	3.3	1.5		1,169
1990	0.2	0.8	35.3	0.0	49.5	7.0	6.9	0.5	1,093
1991	0.1	0.6	21.1	0.1	68.3	4.0	6.0	0.0	1,564

<sup>a</sup> Percentages weighted by total numbers in the escapement: 1989-1991.

Table 35. Length composition of the major age classes of sockeye salmon collected in the Susitna River (Sunshine Station), 1989-1991<sup>a</sup>.

Year	Age Class	Male			Female			Total			Ratio Male/Female
		Ave Length (mm)	Stndrd Error	Sample Size	Ave Length (mm)	Stndrd Error	Sample Size	Ave Length (mm)	Stndrd Error	Sample Size	
1989	1.2	512	4	212	507	2	123	510	3	335	1.7:1
1990		511	0	140	476	0	251	489	0	391	0.6:1
1991		488	0	182	480	2	149	485	2	331	1.2:1
1989	1.3	589	2	317	564	1	454	574	1	771	0.7:1
1990		596	0	208	561	0	329	574	0	573	0.6:1
1991		571	1	520	534	1	546	552	1	1,066	1.0:1

<sup>a</sup> Length measured from mid-eye to fork-of-tail.

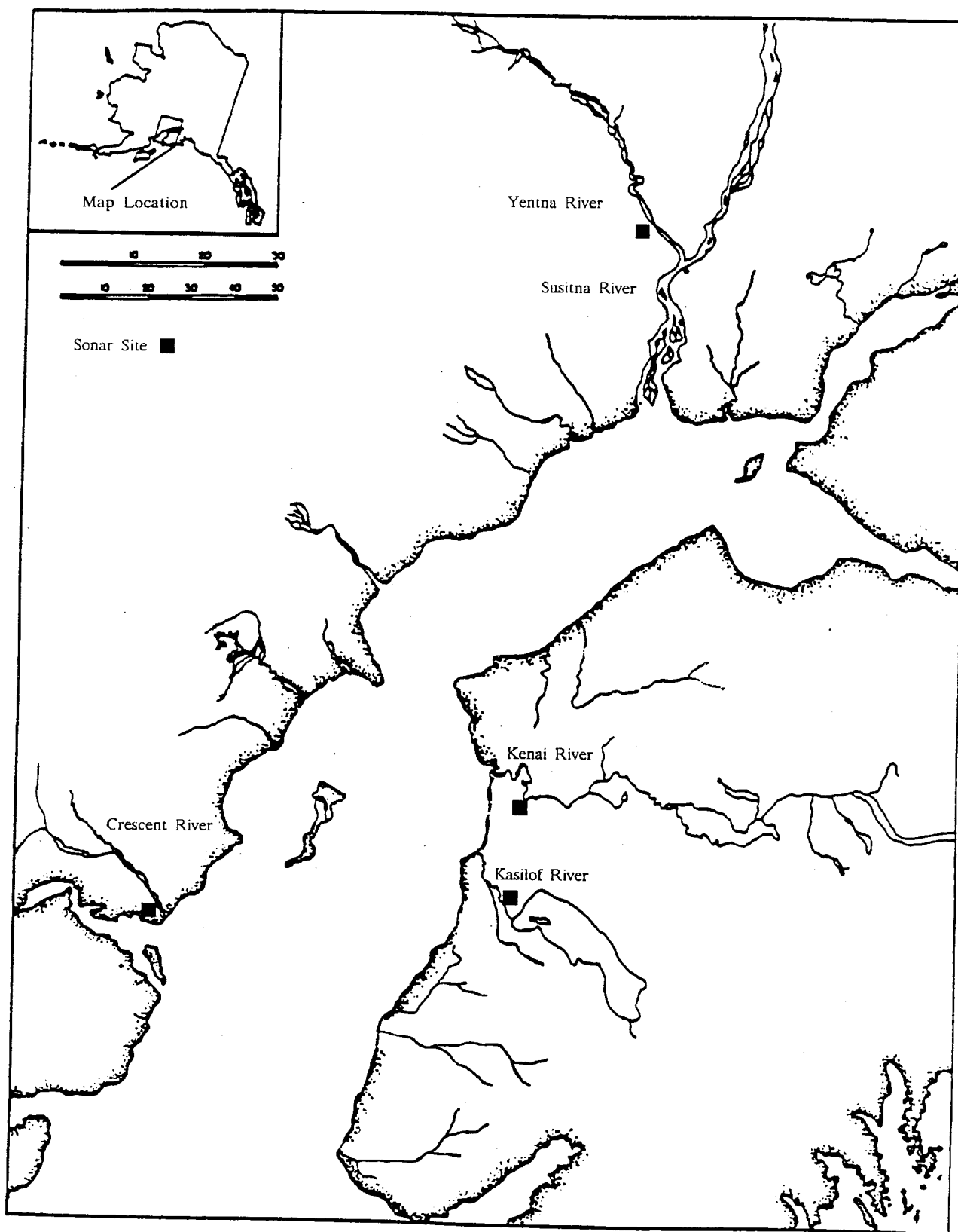


Figure 1. Upper Cook Inlet, Alaska, and sites where sockeye salmon escapement was monitored.

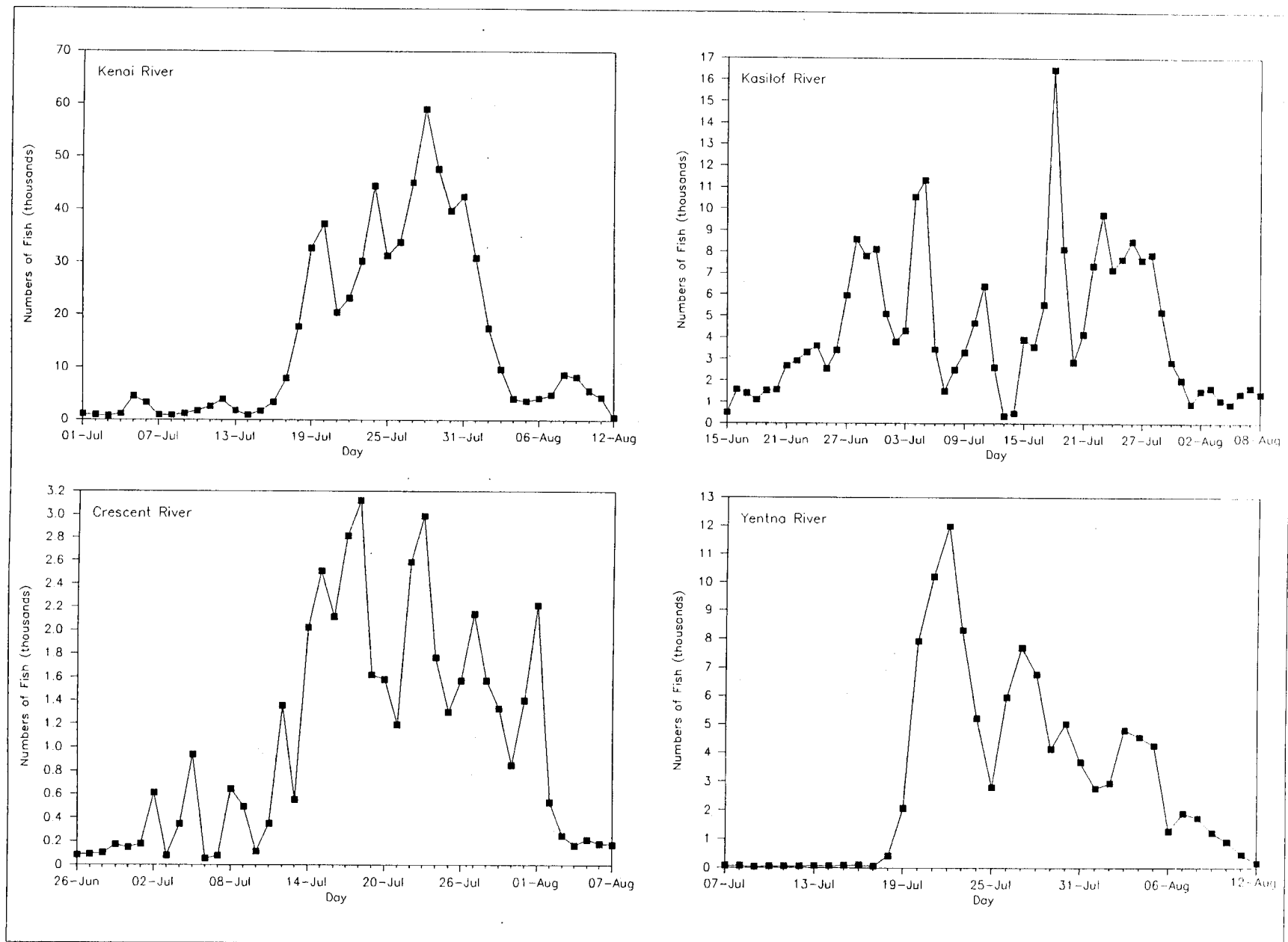


Figure 2. Daily escapement of sockeye salmon into the Kenai, Kasilof, Crescent and Yentna Rivers, 1991.



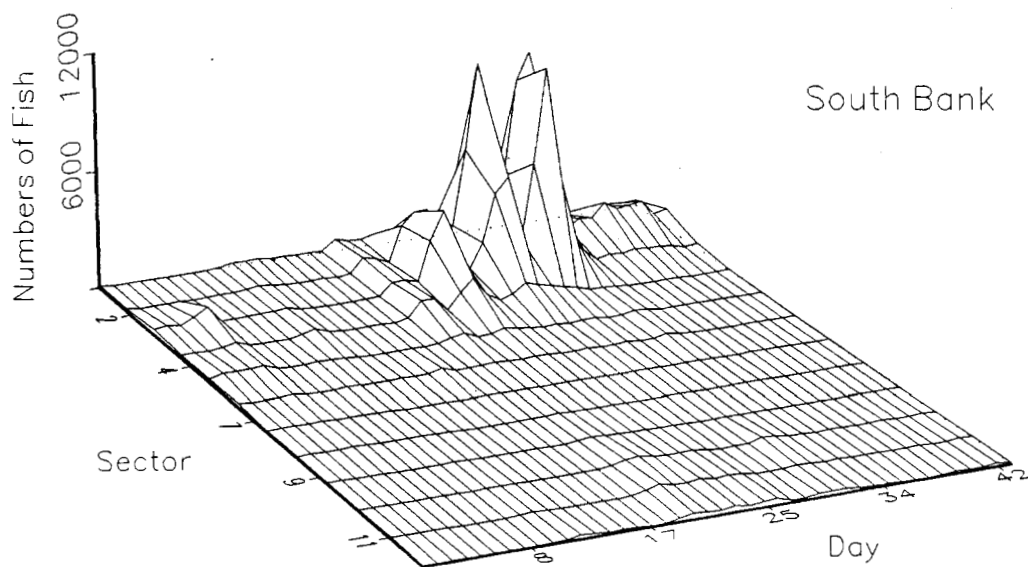
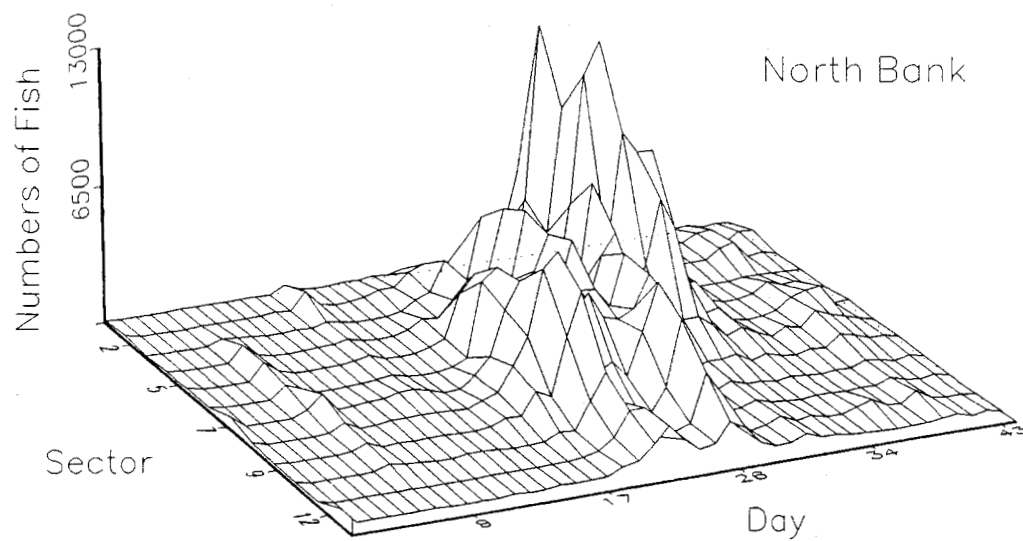


Figure 3. Distribution of salmon sonar counts by sector in the Kenai River, 1991.

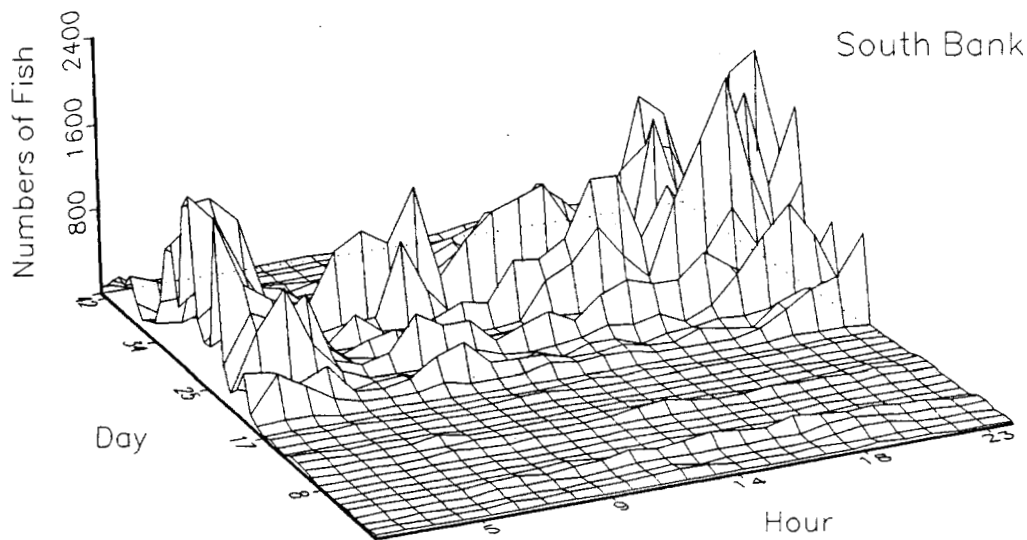
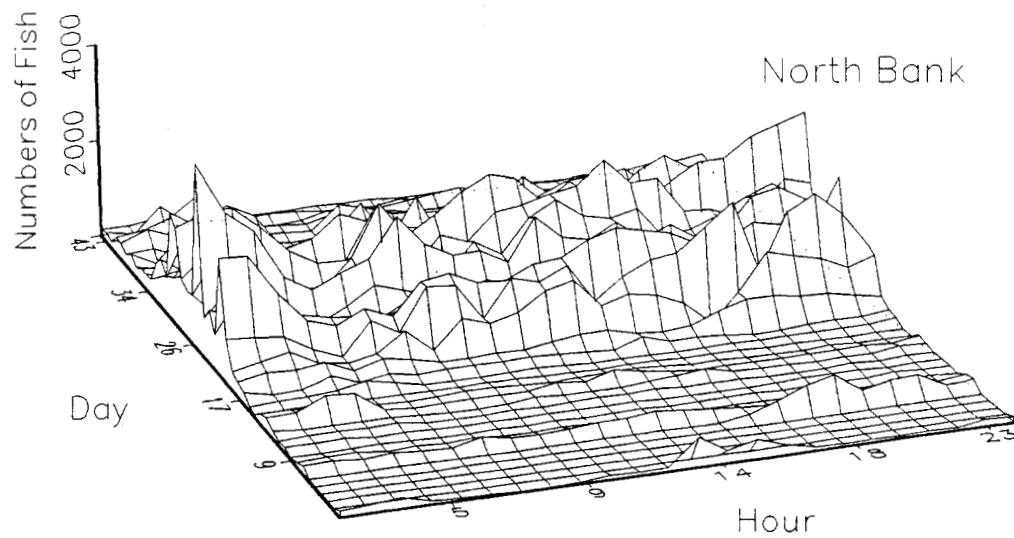


Figure 4. Hourly distribution of salmon migrating past the Kenai River sonar counters, 1991.



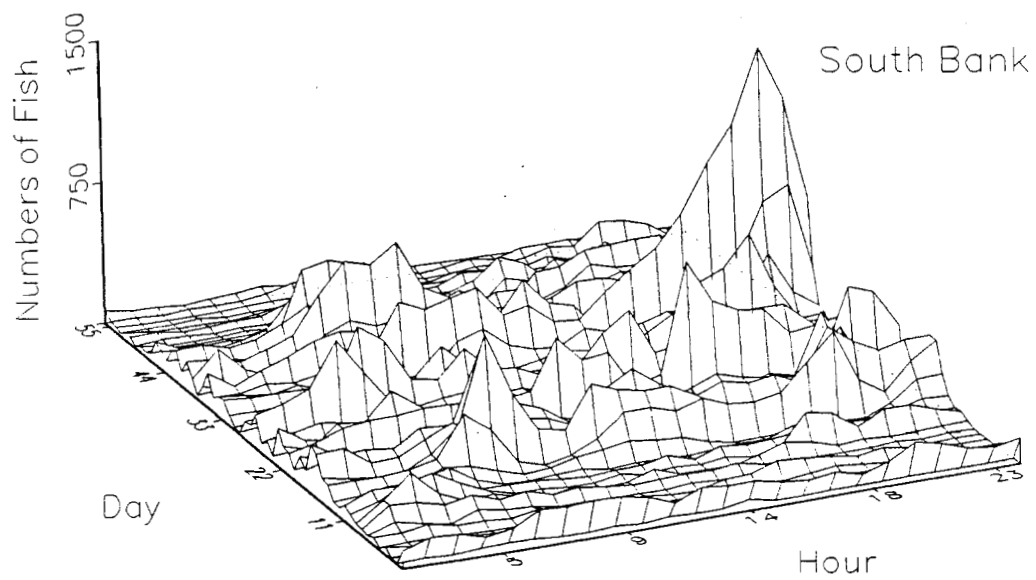
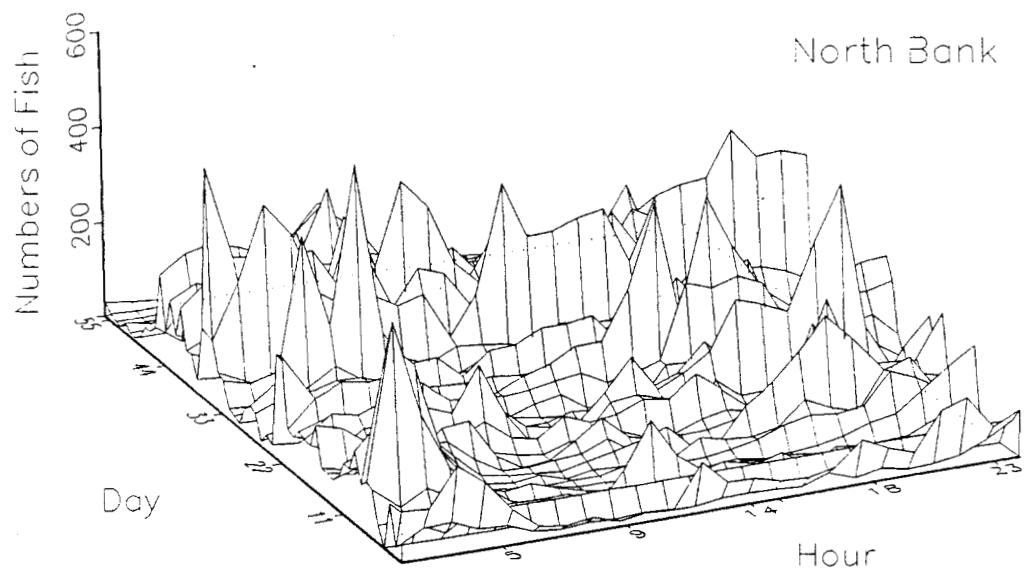


Figure 6. Hourly distribution of salmon migrating past the Kasilof River sonar counters, 1991.

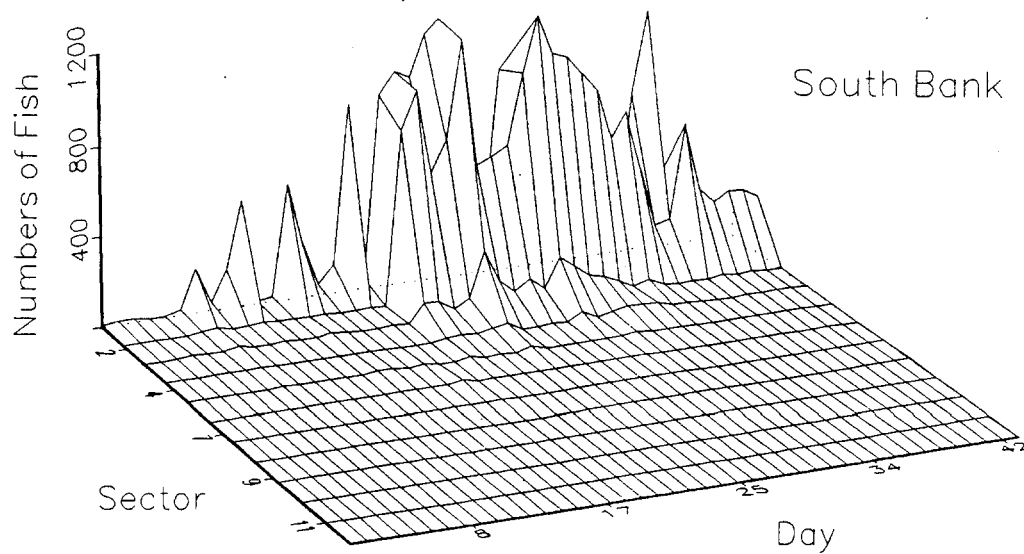
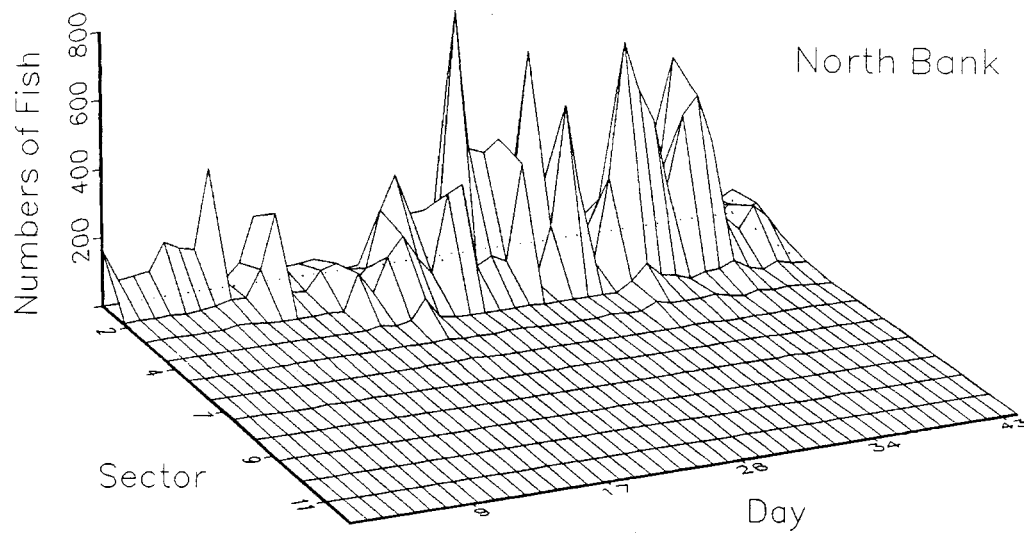


Figure 7. Distribution of salmon sonar counts by sector in the Crescent River, 1991.

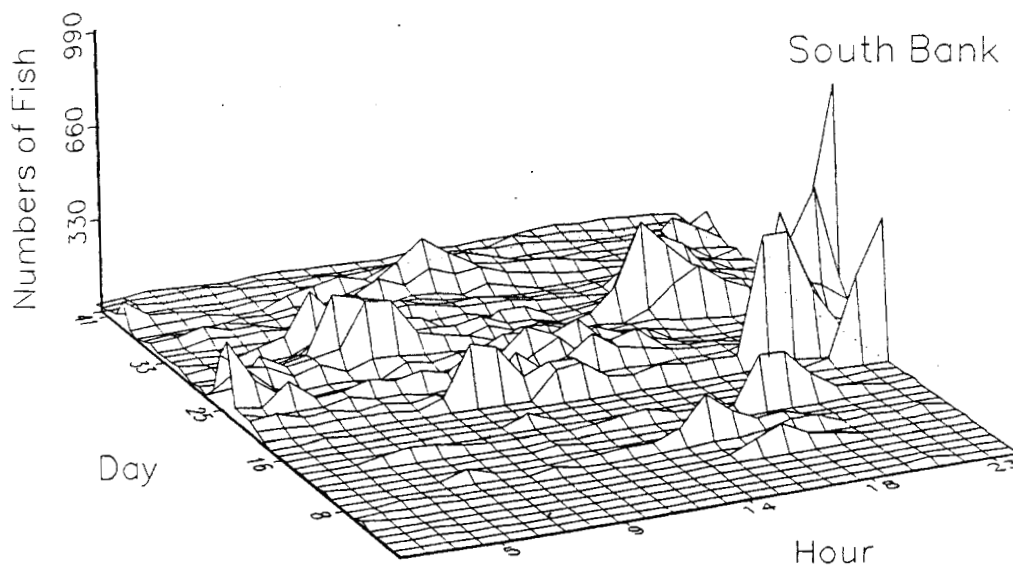
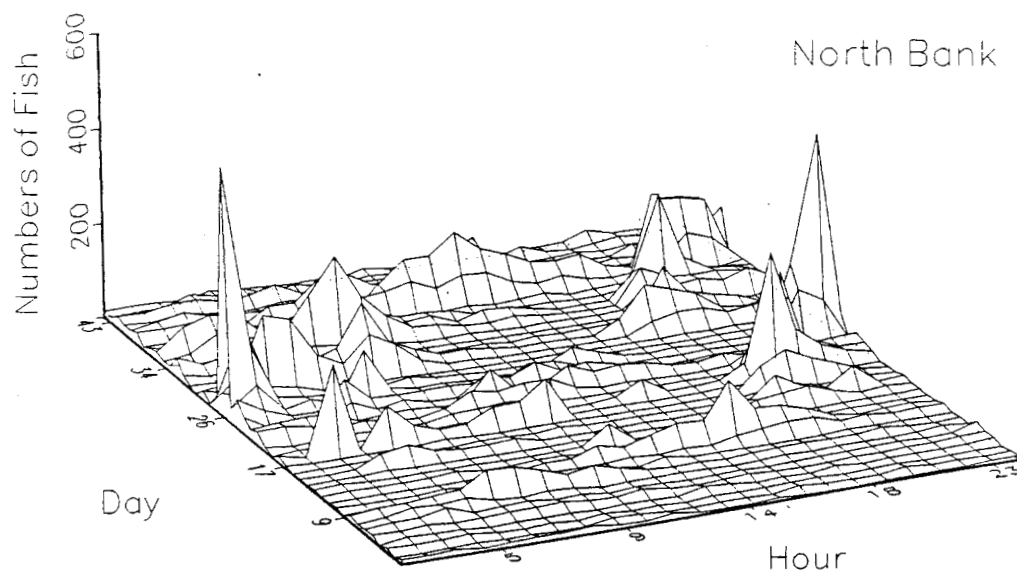


Figure 8. Hourly distribution of salmon migrating past the Crescent River sonar counters, 1991.

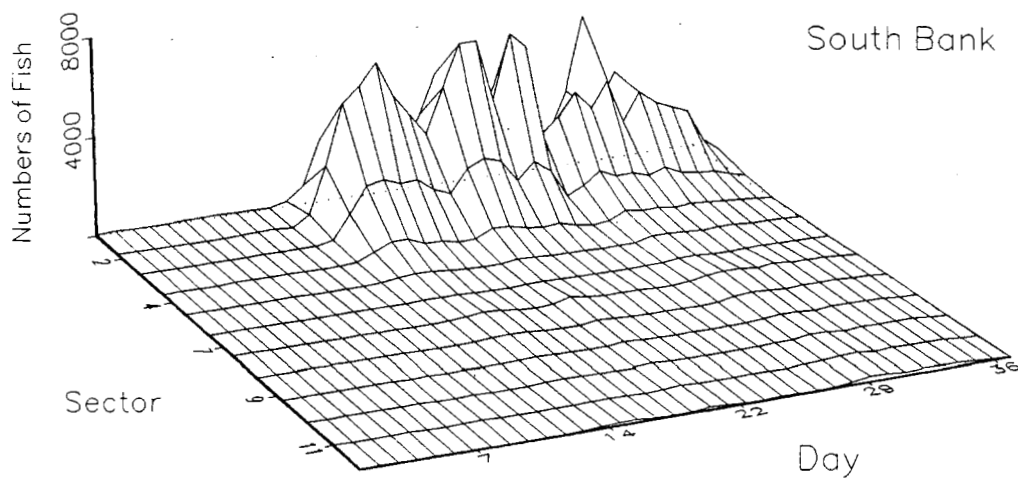
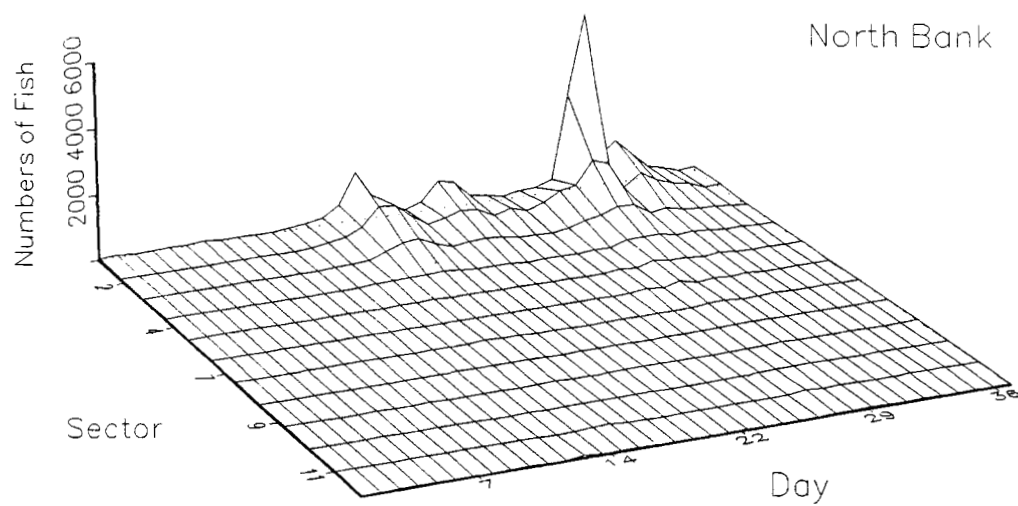


Figure 9. Distribution of salmon sonar counts by sector in the Yentna River, 1991.

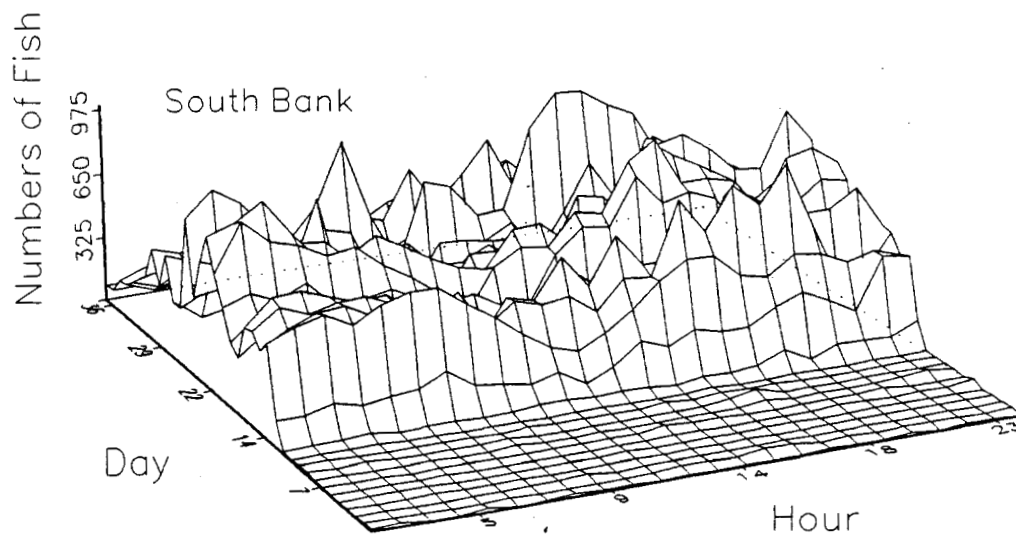
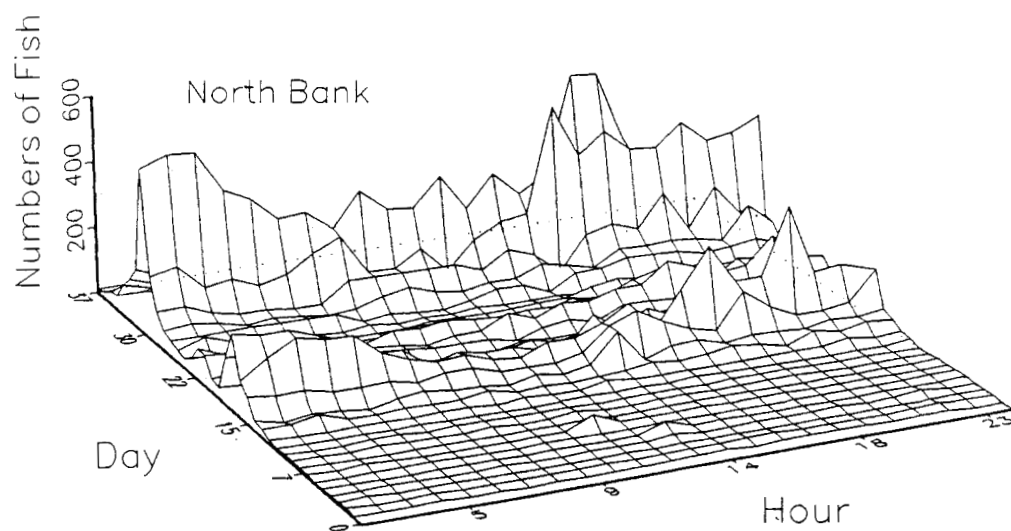


Figure 10. Hourly distribution of salmon migrating past the Yentna River sonar counters, 1991.



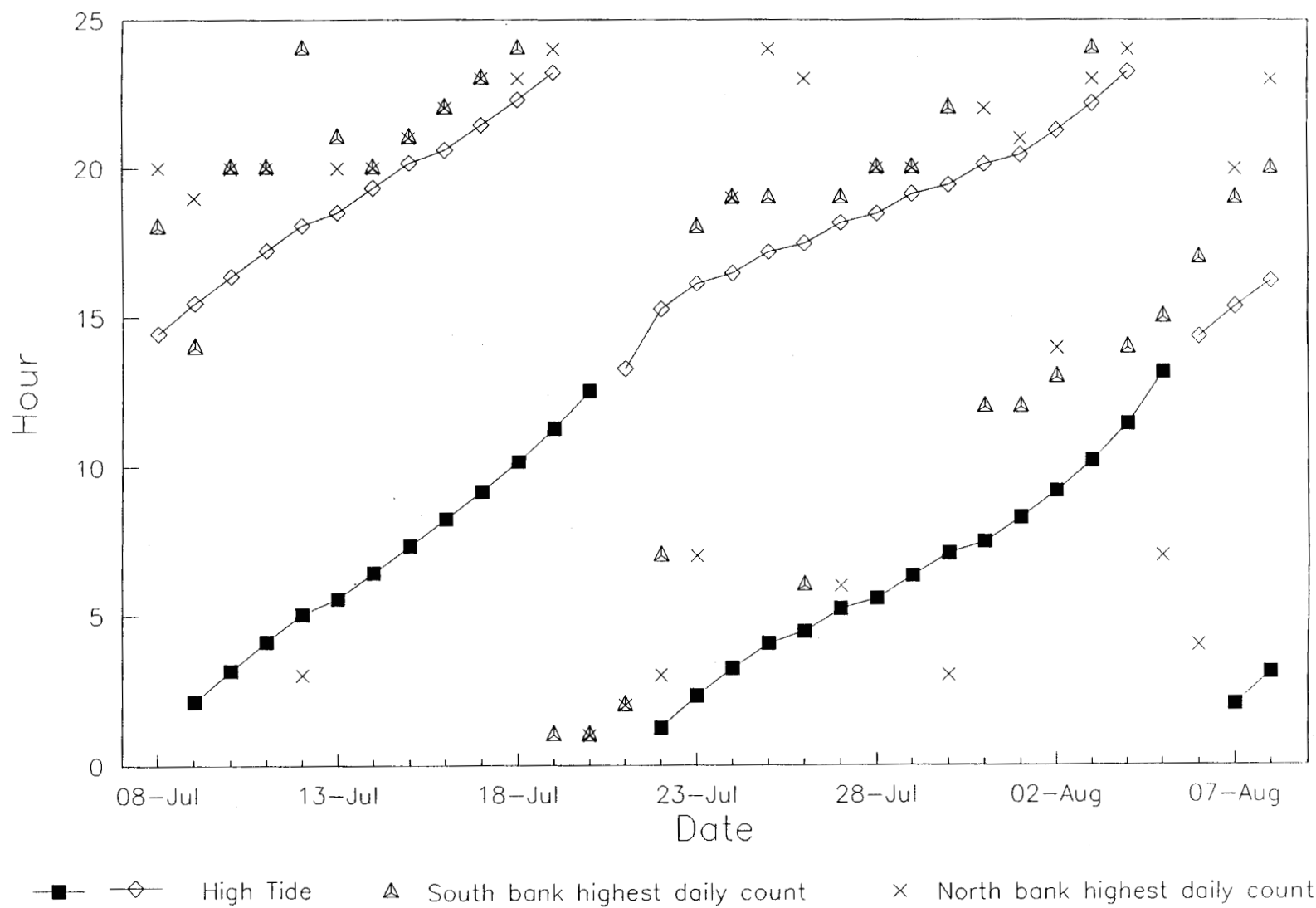


Figure 11. Peak daily counts and daily high tides at Crescent River, 1991.

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